

*CHAPTER 10*

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**ENVIRONMENTAL AND  
SOCIAL CONSIDERATIONS**

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## CHAPTER 10 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

### 10.1 Comparative Analysis of Alternatives Based on Concept of Strategic Environmental Assessment

#### 10.1.1 Description of Alternatives

The objective of this project is to develop an appropriate railway plan which connects CIA to NCR. Several alternative routes have been proposed subject to the following conditions:

- Connect directly between CIA and NAIA; and,
- Plan the route within the existing road/track ROW and public lands.

The Outside Manila Route has the following options:

- i) North Luzon Expressway (NLEX) highway
- ii) PNR line (Northrail Phase I)
- iii) Combination of the above two routes

In addition, the Inside Manila Route has the following options:

- i) Road ROW
- ii) PNR line
- iii) Underground
- iv) Combination of the above three routes

As explained in Section 6.2, the alternative options to be evaluated based on the concept of Strategic Environmental Assessment (SEA) were selected as shown in Table 10.1-1. Refer to Section 6.2 for the maps of the projected routes of these options.

**Table 10.1-1 Alternative Options for Comparative Analysis**

Alternatives	Option A	Option B	Option C	Option D
Outside of Manila	PNR route from Caloocan to Buro I.C. and the NLEX route from Buro I.C to CIA.	NLEX route and on Mindanao Ave. from North Ave. (Trinoma) to CIA.	Existing PNR route (Same as North Rail Project) from Caloocan to CIA.	Same as Option A
Inside of Manila	Existing PNR route from Caloocan to NAIA Terminal 3. The viaduct and underground goes through urbanized zones all the way to NAIA Terminal 3.	Road ROW along Quezon Avenue and the existing PNR route. The viaduct and underground goes through urbanized zones all the way from North Avenue to NAIA Terminal 3.	Same as Option A	Existing PNR route from Caloocan to Santa Mesa. From Santa Mesa to Makati/Global area, the route goes underground all the way to NAIA Terminal 3.

*Source: JICA Study Team*

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## 10.1.2 Comparative Analysis of Alternative Options

A comparative analysis was conducted for the alternative options including a without project option (zero option). The overall evaluation of alternative options from the viewpoints of passenger demand and land development potential, technical feasibility and cost, as well as the natural and social environments is summarized in Table 10.1-2.

With respect to each impact item, the alternative options were qualitatively compared. For the details of the comparison of the alternative options, refer to Section 6.2.3.

Because relocation of informal settlers will not be avoidable for the alternative options, 'involuntary resettlement' was chosen as an item for comparison. From the viewpoint of the natural environment and pollution control, considering the characteristics of the railway project, the items such as 'protected area and biodiversity', 'noise and vibration', 'water quality', 'groundwater/subsidence', 'waste', 'landscape' and 'historical/cultural heritage' were chosen for comparison as shown in Table 10.1-2.

### 1) Without Project Option

The without project option (zero option) is considered to be the case that the Northrail project will also not be implemented. The project has been on hold since September 2011 as explained in Section 3.2.

In accordance with the Philippine Development plan 2011-2016, development of seamless transportation networks in the Subic-Clark-Manila-Batangas growth corridor has been prompted by the Government of the Philippines. The railways will form a part of such corridor. In addition to NAIA, the utilization of CIA should also be increased. However, one of the bottlenecks to discuss the role sharing of both airports, CIA and NAIA, is that there is no railway connecting CIA to the National Capital Region. Therefore, without the project, it is difficult to fulfill the primary objective of developing the growth corridor.

Furthermore, AER is also planned as a commuter for the northern provincial area of Metro Manila. Thus, without the project, the convenience of accessibility might not be enhanced.

### 2) Analysis of Alternative Options

Options A and C were recommended by the JICA Study Team.

- The project cost is less than the other options, and also the number of passengers per project cost is larger than for the other options.
- The number of affected families is larger than the other options, but thousands of families had been already relocated by Northrail so far, and quite a few experiences have been accumulated.

Options B was not recommended by the JICA Study Team.

- The center 2 lanes of NLEX need to be closed due to installation of the elevated tracks between Burol I.C. and Mindanao Avenue I.C. This will cause traffic jams in NLEX.
- The project cost is the highest, and also the number of passengers per cost is the smallest among the alternative options.

Option C was finally selected by the second JCC. The selected route was determined between EDSA to CIA in accordance with DOTC suggestions.

**Table 10.1-2 Comparison of Alternative Options – Social and Natural Environment**

Alternatives Items	Option A NLEX (Burol to CIA) and PNR Route (Burol to NAVA)	Option B NLEX and North Ave to Quezon Ave and PNR Route	Option C PNR Route	Option D NLEX (Burol to CIA) and PNR/Makati/Global Route	Zero Option
<b>Social environment</b>					
Involuntary resettlement	<p>- Informal settlers have occupied the Clark Airport on the north side of the SCTEX Mabiga Exit, and large scale displacement (about 900 families) will be unavoidable.</p> <p>- The connection route between PNR line and Burol I.C. requires additional land acquisition. Involuntary resettlement is unavoidable (about 100 families).</p> <ul style="list-style-type: none"> <li>No large scale resettlement may be anticipated along NLEX.</li> <li>Relocation of informal settler families has been completed between Caloocan and Malolos.</li> </ul>	<p>- Informal settlers have occupied the PNR ROW along the Clark Airport on the north side of the SCTEX Mabiga Exit, and large scale relocation (about 900 families) will be unavoidable.</p> <ul style="list-style-type: none"> <li>Additional land acquisition will be needed at the underpass section on Mindanao Avenue. Large scale displacement may not be avoided (about 50 families).</li> <li>No large scale resettlement may be anticipated along NLEX.</li> </ul>	<p>- Informal settlers have occupied the following areas in PNR ROW, therefore large scale relocation (about 1,700 families) will be unavoidable.</p> <ul style="list-style-type: none"> <li>Along the CIA at Mabalacat</li> <li>Cities of San Fernando and Angeles</li> <li>Calumpit</li> </ul> <p>- Involuntary resettlement is unavoidable due to additional land acquisition for the narrow ROW sections, e.g., river banks near San Fernando and Calumpit.</p>	Same as Option A	-Involuntary resettlement due to additional land acquisition will not occur.
	<p>- Resettlement due to additional land acquisition for all station areas will be needed.</p> <p>- Relocation of informal settlers will be unavoidable along the existing PNR route (about 1,500 families).</p>	<p>- Land acquisition and large scale resettlement (about 2,000 families) will be needed in the following portions:</p> <ul style="list-style-type: none"> <li>Between Trinoma Terminal and Quezon Avenue</li> <li>Between España Boulevard and PNR España Station</li> <li>Underpass Section on Quezon Avenue</li> </ul>	Same as Option A	-Resettlement due to additional land acquisition for all station areas will be needed.	-Involuntary resettlement due to additional land acquisition will not occur.
	<p>- There is no protected area in the vicinity of the project area.</p> <p>- Temporary land alteration in swamp area will likely occur due to the installation of access roads.</p> <p>- Viaduct zone: Noise and vibration will cause a nuisance along the route, especially for</p>	Same as Option A	<p>- There is no protected area in the vicinity of the project area.</p> <p>- Land alteration area will be smaller than other options because of a few access roads.</p> <p>- Since the viaduct zone in the residential area is longer than other options, noise and</p>	Same as Option A	-Natural environmental conditions will remain the same.
<b>Natural environment and pollution control</b>					
Protected area and biodiversity					
Noise and vibration					

Items	Alternatives	Option A NLEX (Burol to CIA) and PNR Route (Burol to NAIA) residential areas. - Tunnel zone: Vibration will cause a nuisance along the tunnel, especially for residential areas. -Surface water, such as swamps, rivers and creeks will be likely to be deteriorated by suspended solids discharged from construction sites. -Digging of tunnels will be likely to cut off underground water veins and deteriorate the groundwater quality. The change of underground water flow might cause ground subsidence. - Disposal of waste soil generated from digging and excavation of tunnels will be needed, but the amount of disposal soil is less than that of Option D.	Option B NLEX and North Ave to Quezon Ave and PNR Route	Option C PNR Route vibration may cause a larger impact. Same as Option A	Option D NLEX (Burol to CIA) and PNR/Makati/Global Route larger nuisance than other options. Same as Option A	Zero Option
Water quality			Same as Option A	Same as Option A	Same as Option A	Surface water quality will not be deteriorated.
Groundwater/ subsidence			Same as Option A	Same as Option A	-Since the tunnel zone is the longest inside Mamla, the risk is higher than in the other options.	-Underground water conditions will not be changed.
Waste			Same as Option A	Same as Option A	- Disposal of waste soil generated from digging and excavation of tunnels will be needed, and the amount of disposal soil is greater than other Options. (Historical/cultural heritage) - There is no historical/cultural heritage site in the project area. (Landscape) - There will be no impacts on landscape, surface business or traffic since the tunnel section is the longest.	- No waste soil will be generated.
Others	(Historical/cultural heritage) The old PNR stations such as Paco are recognized as historical heritage sites and are considered for preservation. (Landscape) The elevated structure might affect the landscape in local towns.		Same as Option A	Same as Option A		- The condition of historical stations and landscape will remain the same.

Source: JICA Study Team

## 10.2 Present Environmental and Social Conditions

### 10.2.1 Existing ROW Conditions of Alternatives

Existing ROW conditions of the alternative options are summarized based on the results of field reconnaissance conducted by the JICA Study Team.

#### 1) NLEX route – Outside of Manila

##### a) Zone 1

- Mindanao Avenue is 4 lanes each way.
- NLEX is 32 meters wide with 4 lanes each way and a central reserve 1m wide.
- The ROW is 60 meters wide between Mindanao Ave. IC and Burol IC.

##### b) Zone 2

- Candaba Viaduct of 5.5km length runs through the swampy area between Pulian I.C. and San Simon I.C.
- NLEX has 3 lanes each way, 32 m in width.
- There are spatial central reserves in the center of the expressway in this zone.
- The ROW width is 60 m between Burol IC and San Fernando IC.

##### c) Zone 3

- NLEX between San Simon I.C. and San Fernando I.C. lies on the embankment in swampy areas.
- NLEX width is 32 m with 2 lanes each way. There is more open space in the center of the expressway. The ROW width is 60 m between San Fernando IC and Spur NLEX IC.

#### 2) Connection Route between PNR and NLEX - Outside of Manila

- There is an old PNR branch track from Balagtas Station to Gapan City, located in Zone 2.
- The ROW width is 12 m.
- There are several houses scattered on both sides of the ROW between PNR route and NLEX.

#### 3) PNR route – Outside of Manila

##### a) Zone 1

- Most of the ROW runs along the residential area but no informal settlers are currently inside of the ROW.
- The ROW is located close to the main road between Caloocan and Marilao.
- Many parts of the ROW go through flood hazard areas.
- The ROW width is 11 m between Caloocan and Malolos in some areas.

##### b) Zone 2

- The ROW goes through the fish pond and swampy areas. The vicinity is almost inundated by the swamp. There will be a high risk of inundation.
- Guiguinto Viaduct installed by a Chinese Contractor has been abandoned.
- There are many houses scattered in the ROW before and after Calumpit Station, for about 9 km in length. Many informal settler families have been waiting for relocation.
- There is a narrow ROW section 4m wide between Calumpit Station and Manpang River.

##### c) Zone 3

- The ROW with 6.5km length has been occupied by informal settlers along the Clark Air Port at Mabalacat.
- The ROW has been scoured for 2.3 kilometers along Cultcut Creek.

- The banks of Abacan River have been scoured between Angeles Station and Clark Station.
- There are narrow ROW sections, e.g., riverbanks near San Fernando and Columpit.
- The old PNR stations, e.g., San Fernando Station, are recognized as historical heritage sites.
- There are many houses scattered in the ROW around San Fernando Station.
- There is narrow right of way 7m wide at the south side of San Fernando Station.

#### 4) PNR route – Inside of Manila

##### a) Caloocan - Santa Mesa

- Double track has been constructed but is partially uncompleted. Single track is opened for carrying railcars from Caloocan depot.
- There are 5 existing stations including Caloocan, Blumentritt, and Laong Laan.
- Informal settlers are observed along the old PNR route just south of Caloocan Work Shop, on the north side of the Depot site, and near C3 Road, PNR Hermosa Station and the crossover section near PNR Solis Station.
- There are also informal settler areas along Valencia Creek, around the new station of Santa Mesa beside of the Magsaysay flyover.

##### b) Santa Mesa - NAIA

- There are 9 existing stations including Santa Mesa, Pandacan, Paco, San Andres, Buendia, EDSA and Nichols.
- The PNR route crosses Pasig River, which is 150 m wide and 7 small creeks.
- Some informal settlers are observed around the piers and abutments of the flyovers.

#### 5) North Avenue to España Boulevard – Inside of Manila

- There is no existing road/railway ROW between Trinoma and Quezon Avenue in the West Triangle in Quezon City.

#### 10.2.2 Present Natural and Social Environment

The detailed information on the present natural and social environment is presented in Appendix D.

### 10.3 Review of Legal and Institutional Framework of Social and Environmental Considerations in the Philippines

#### 10.3.1 EIA procedure and EIA related Laws and Regulations

##### 1) Laws and Regulations of Environmental Impact Assessment (EIA)

Any private or public projects or activities which are likely to have foreseeable adverse effects on the natural and social environment are subject to the Philippine Environmental Impact Statement System (PEISS). Aware of the potential negative impacts of implementation of industrial and other activities, the Philippine government has instituted measures to encourage the use of EIA as a planning and decision making tool. PEISS is the set of laws, regulations, administrative orders and guidelines concerned with EIA. Among them some of the most important laws and guidelines are the following:

- a) **Environmental Impact Statement (EIS) System, Presidential Decree No. 1586 (1978)**  
An act establishing and centralizing the Environmental Impact Statement (EIS) System under the National Environmental Protection Council, which emerged with the National Pollution Control Commission in June 1987 to become the Environmental Management Bureau (EMB).
- b) **Presidential Proclamation No. 2146 (1981) and No. 803 (1996)**  
This proclaims Environmentally Critical Projects (ECPs) to have significant impacts on the quality of the environment and Environmentally Critical Areas (ECAs) as environmentally fragile areas within the scope of the EIS System.
- c) **DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007)**  
This provides implementing rules and regulations of Presidential Decree No. 1586, establishing the Philippine Environmental Impact Statement System (PEISS). Also, detailed information in definitions of technical terms, procedures, related laws and regulations are described.

##### 2) Responsible Government Authorities

The review and supervision of PEISS are conducted by the Environmental Management Bureau, Department of Environment and Natural Resources (DENR-EMB). The Department of Environment and Natural Resources (DENR) is the government entity which is mandated to handle issues related to the following five tasks as described in the legislations concerned.

- Assure the availability and sustainability of the country's natural resources through judicious use and systematic restoration or replacement, whenever possible;
- Increase the productivity of natural resources in order to meet the demands for forest, mineral, and land resources of a growing population;
- Enhance the contribution of natural resources for achieving national economic and social development;
- Promote equitable access to natural resources by the different sectors of the population;
- Conserve specific terrestrial and marine areas representative of the Philippine natural and cultural heritage for present and future generations.

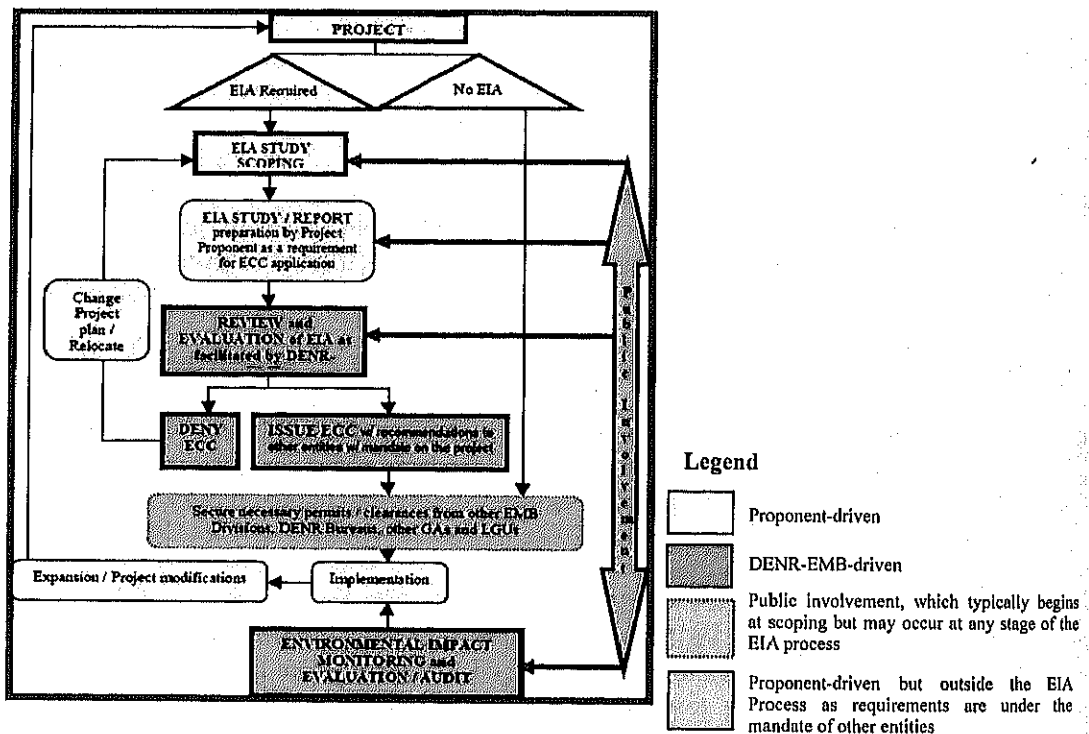
EMB is responsible for the issuance of decision making documents such as the Environmental Compliance Certificate (ECC) and Certificate of Non-Coverage (CNC) for PEISS. EMB Regional Offices in respective regions are primarily responsible for the consultation and supervision of development projects.



### 3) Process of PEISS

Application into the EIS System requires compliance with certain stages of the EIA Process. Requirements per EIA stage vary depending on the project group/type being applied for. A summary flowchart of the complete process is presented in Figure 10.1-3.

The Philippine EIA Process has six sequential stages: Screening; Scoping; EIA Study and Report Preparation; EIA Review and Evaluation; Decision Making and Post-ECC Monitoring; Validation and Evaluation/Audit stage. The first five stages are those involved when a Proponent applies for ECC or CNC. In particular, for the stages of EIA Review and Evaluation driven by DENR-EMB, the maximum workdays are summarized in Table 10.1-4.



Source: DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007)

Figure 10.3-1 Flow Chart of EIA Process in the Philippines

Table 10.3-1 EIS Review Duration in DENR-EMB

Review and Evaluation Steps	Maximum Workdays in DENR-EMB
EMB-Controlled Review Process	90 days
Endorsement of Recommendation	15 days
Sign-off/ Issuance of Decision Document	15 days

Source: DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007)

### 4) Covered PEISS Projects

Covered PEISS projects are projects which have been originally declared as Environmentally Critical Projects (ECPs) or projects in Environmentally Critical Areas (ECAs) presumed to have significant impacts on the quality of the environment, and to be subjects of PEISS. The four ECP project types and

twelve ECA categories have been declared through Proclamation No. 2146 (1981) and Proclamation No. 803 (1996), as shown in Table 10.1-5 and Table 10.1-6.

**Table 10.3-2 Summary of Environmentally Critical Projects (ECPs)**

Main Category	Sub-Category
A. Heavy Industries	<ul style="list-style-type: none"> <li>• Non-Ferrous Metal Industries</li> <li>• Iron and Steel Mills</li> <li>• Petroleum and Petrochemical Industries</li> <li>• Smelting Plants</li> </ul>
B. Resource Extractive Industries	<ul style="list-style-type: none"> <li>• Major Mining and Quarrying Projects</li> <li>• Forestry Projects</li> <li>• Dikes for/and Fishpond Development Projects</li> </ul>
C. Infrastructures	<ul style="list-style-type: none"> <li>• Major Dams</li> <li>• Major Power Plants</li> <li>• Major Reclamation Projects</li> <li>• Major Roads and Bridges</li> </ul>
D. Golf Courses	-

Source: DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007)

**Table 10.3-3 Summary of Environmentally Critical Areas (ECAs)**

ECA Categories	Examples
A. Areas declared by law as national parks, watershed reserves, wildlife preserves, and sanctuaries	<ul style="list-style-type: none"> <li>• Areas of the National Integrated Protected Areas System Act</li> </ul>
B. Areas set aside as aesthetic, potential tourist spots	<ul style="list-style-type: none"> <li>• Areas declared and reserved by the Department of Tourism or other authorities for tourism development</li> </ul>
C. Areas which constitute the habitat for any endangered or threatened species of indigenous Philippine wildlife (flora and fauna)	<ul style="list-style-type: none"> <li>• Areas inhabited by indeterminate species, threatened species, rare species, endangered species</li> </ul>
D. Areas of unique historic, archeological, geological, or scientific interests	<ul style="list-style-type: none"> <li>• National historical landmarks, geological monuments, paleontological and anthropological reservations as designated or determined by the National Historical Institute, National Museum, National Commission for Culture and the Arts, National Commission on Geological Sciences, and other authorities</li> </ul>
E. Areas which are traditionally occupied by cultural communities or tribes	<ul style="list-style-type: none"> <li>• Ancestral lands maintained by the PANAMIN for national minorities</li> <li>• Areas that are occupied or claimed as ancestral lands or ancestral domains by indigenous communities</li> </ul>
F. Areas frequently and or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity, etc.)	<ul style="list-style-type: none"> <li>• Areas frequently or hard-hit by typhoons</li> <li>• Areas frequently or hard-hit by tsunamis</li> <li>• Areas frequently or hard hit by earthquakes</li> <li>• Storm surge-prone areas</li> <li>• Flood-prone areas</li> <li>• Areas prone to volcanic activities</li> <li>• Areas located along fault lines or within fault zones</li> <li>• Drought-prone areas</li> </ul>
G. Areas with critical slope	<ul style="list-style-type: none"> <li>• Lands with slope of 50% or more</li> <li>• Alienable and disposable forest lands and unclassified forests</li> </ul>
H. Areas classified as prime agricultural lands	<ul style="list-style-type: none"> <li>• Irrigated and irrigable areas and other areas mapped under the Network of Protected Areas for Agriculture of the Bureau of Soils and Water Management</li> </ul>
I. Recharged areas of aquifers	<ul style="list-style-type: none"> <li>• Areas of sources of water replenishment</li> </ul>

ECA Categories	Examples
J. Water bodies	<ul style="list-style-type: none"> <li>• Areas that are tapped for domestic purposes</li> <li>• Areas which support wildlife and/or fishery activities</li> </ul>
K. Mangrove Areas	<ul style="list-style-type: none"> <li>• Tidal areas covered by salt-tolerant, intertidal tree species</li> <li>• Areas declared as mangrove swamp forest reserves</li> </ul>
L. Coral Reefs	<ul style="list-style-type: none"> <li>• Areas characterized by the assemblage of different types of marine plants and organisms</li> <li>• Areas identified by local sources such as the UP-Marine Sciences Institute, DENR-Coastal Environment Program to be rich in corals.</li> </ul>

Source: DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007)

To help identifying required documents under PEISS for consultation and decision making by EMB-DENR, projects are classified into five major groups as described in Table 10.1-7.

**Table 10.3-4 Project Groups for EIA under PEISS**

Group I	ECPs in either ECAs or NECAs (Environmentally Critical Projects in either Environmentally Critical Areas or Non-Environmentally Critical Areas)
Group II	NECPs in ECAs (Non-Environmentally Critical Projects in Environmentally Critical Areas)
Group III	NECPs in NECAs (Non-Environmentally Critical Projects in Non-Environmentally Critical Areas)
Group IV	Co-located Projects in either ECA or NECA
Group V	Unclassified Projects

Source: DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007)

EIA-covered projects in Groups I, II and IV require either of the following depending on project type, location, magnitude of potential impacts and project threshold. For non-covered projects in Groups II and III, the Project Description Report is required.

- i) Environmental Impact Statement (EIS)
- ii) Programmatic EIS (PEIS)
- iii) Initial Environmental Examination Report (IEER), or
- iv) IEE Checklist (IEEC)
- v) Project Description Report (PDR)

All documents should be prepared by the project proponent to be submitted to the EMB Central Office or the Environmental Impact Assessment Division in the respective EMB Regional Office. The outcome of the EIA Process within PEISS administered by the EMB-DENR is the issuance of decision documents. Decision documents may either be an ECC, CNC or a Denial Letter, described as follows:

- i) An ECC is issued as a certificate of Environmental Compliance Commitment to which the Proponent conforms, after DENR-EMB explains the ECC conditions.
- ii) A Certificate of Non-Coverage (CNC) certifies that, based on the submitted Project Description Report (PDR), the project is not covered by the EIS System and is not required to secure an ECC.
- iii) A Denial Letter shall contain an explanation for the disapproval of the application and guidance on how the application can be improved to a level of acceptability in the next EIA process.

For Group I projects, ECC application documents need to be submitted to the EMB central office to receive a decision from the EMB Director or DENR Secretary. While an ECC application for Group II needs to be submitted to the EMB Regional Office to receive a decision from the EMB Regional Director. Table 10.1-8 summarizes Project Groups, EIA Report Types, Decision Documents, Deciding Authorities and Processing Duration.

**Table 10.3-5 Summary of Project Groups, EIA Report Types, Decision Documents, Deciding Authorities and Processing Duration**

Project Groups	Documents Required For ECC/CNC Application	Decision Document	Deciding Authority	Max Processing Duration
I: Environmentally Critical Projects (ECPs) in either an Environmentally Critical Area (ECA) or Non-Environmentally Critical Area (NECA)	Environmental Impact Statement (EIS)	ECC	EMB Director / DENR Secretary	120 days (Working Days)
II: Non-Environmentally Critical Projects (NECPs) in an Environmentally Critical Area (ECA)	Environmental Impact Statement (EIS) / Initial Environmental Examination Report (IEER) /Initial Environmental Examination Checklist (IEEC) /Project Description Report (PDR)	ECC	EMB RO Director	15-60 days (Working Days)
III: Non-Environmentally Critical Projects (NECPs) in a Non-Environmentally Critical Area (NECA)	Project Description Report (PDR)	CNC	EMB Director / EMB RO Director	15 days (Working Days)
IV: Co-located Projects	Programmatic Environmental Impact Statement (PEIS)	ECC	DENR Secretary	180 days (Working Days)
V: Unclassified Projects	Project Description Report (PDR)	CNC or Recommendation on Final Grouping and EIA Report Type	EMB Director /DENR Secretary/EMB RO Director	15 days (Working Days)

Source: DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007)

**5) Scope of Items to be Examined and Contents to be Assessed in the EIA report**

As previously discussed, depending on project type, location, magnitude of potential impacts and project threshold, an EIS, IEER or PDR will be required. According to the Memorandum Circular No. 2010-14 "Standardization of Requirements and Enhancement of Public Participation in the Streamlined Implementation of the Philippine EIS System" by DENR (June 29 2010), the outline for EIA Reports for proposed new single projects is shown in Table 10.1-9.

**Table 10.3-6 Outline of EIA Reports for Proposed (New) Single Projects**

Project Fact Sheet	
Table of Contents	
Executive Summary	
I.	Project Description
1.1	Project Location and Area
1.2	Project Rationale
1.3	Project Alternatives
1.4	Project Components
1.5	Process/Technology Options
1.6	Project Size
1.7	Development Plan, Description of Project Phase and Corresponding Time frames
1.8	Manpower
1.9	Indicative Project Investment Cost
II.	Analysis of Key Environmental Impacts
2.1	Land
2.1.1	Land Use and Classification
2.1.2	Geology and Geomorphology
2.1.3	Pedology
2.1.4	Terrestrial Biology
2.2	Water
2.2.1	Hydrology & Hydrogeology
2.2.2	Oceanography
2.2.3	Water Quality
2.2.4	Freshwater or Marine Biology
2.3	Air
2.3.1	Meteorology/Climatology
2.3.2	Air Quality (and Noise)
2.4	People
2.4.1	Identify settlers that will be displaced from among the existing settlers
2.4.2	Discuss the in-migration patterns impact as a result of project implementation
2.4.3	Discuss the impacts on IPs and Culture/Lifestyle (if any)
2.4.4	Discuss the project implementation's threat to public health vis-a-vis the baseline health conditions in the area
2.4.5	Discuss local benefits expected from project implementation
2.4.6	Discuss how the project would affect the delivery of basic services and resource competition in the area
2.4.7	Discuss how the project would affect the traffic situation in the area
2.4.8	Identify the entity to be accountable for environmental management in the area
2.4.9	Discuss how the project would affect existing properties in the area in terms of relocation and devaluation
2.4.10	Identify affected properties
III.	Environmental/Ecological Risk Assessment
IV.	Impact Management Plan
V.	Social Development Framework and IEC Framework
VI.	Environmental Compliance Monitoring
VII.	Emergency Response Policy and Generic Guidelines
VIII.	Abandonment/ Decommissioning/Rehabilitation Policies and Generic Guidelines
IX.	Institutional Plan for EMP Implementation
Bibliography/References	
Annexes	

Source: DENR Memorandum Circular NO. 2010-14, Annex 1-A, June 2010

## 6) Public Participation, Public Consultation and Information Disclosure

The PEISS places importance on public participation. According to DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007), public participation shall be demonstrated through the following activities:

- i) As part of the social preparation process at pre-Scoping, Information, Education and Communication (IEC) of Local Government Units (LGUs) is now explicitly required at the minimum of PEIS/EIS based applications for new or modification proposals for which Public Scoping is a requirement. The IEC serves as a basis for preliminary identification of stakeholders and related issues in preparation for the Scoping proper.
- ii) Public Scoping for PEIS/EIS-based new projects is now more meaningful as community inputs will precede the Technical Scoping of the EIA Review Team with the proponent, and will be formally considered before the sign-off of the Scoping Checklist that comprises the final TOR of the EIA Study. Key stakeholder representatives, EMB personnel, EIA Review Committee and the Proponent/Preparer representatives will also sign off the List of Issues raised during the Public Scoping.
- iii) The conduct of the EIA Study shall include local stakeholders, who may serve as local expert sources, aides/guides and resource persons in primary data collection to optimize access to indigenous knowledge of the environment, or as interviewers/interviewees in the socio-economic/perception surveys which shall be used as the basis for the subsequent formulation of social development plans, IEC, monitoring plans and other components of the environmental management plans.
- iv) As a form of disclosure of the EIA findings, a Public Hearing is required for all new ECPs for which Public Scoping was undertaken and for PEIS-based applications. A waiver of the Public Hearing requested by the Proponent may be granted by the DENR-EMB subject to the absence of mounting opposition or written request for one with valid basis and Public Consultation may be conducted instead of a Public Hearing. The Notice of a Public Hearing provides explicit instructions on registration, access to the EIA Report (with Project Fact Sheet written in the local dialect or mixed with the popularly known language of the host communities), preparation of position papers, and on the mechanics of how issues may be received before or during the hearing. Prior to Public Hearings or Public Consultations, the Proponent is required to give copies of the full EIA Report to the EMB Regional Offices and host municipalities; copies of the Executive Summary to the host barangays; and copies of Project Fact Sheets to other stakeholders for well-informed participation in the hearing/consultation process.
- v) Once an ECC/CNC is issued, the EIA recommendations are transmitted by the DENR-EMB to the concerned LGUs and government agencies to be considered in their decision-making process. This results in a more integrated, coordinated and participative safeguarding of environmental concerns.

## 7) Environmental Monitoring and Audit

### (1) Objectives of Compliance Monitoring and Evaluation

Under the Philippine EIS System, the primary purpose of the monitoring, validation and evaluation/audit is to ensure the judicious implementation of sound environmental management within a company / corporation and its areas of operation as stipulated in the ECC and other related documents. Specifically, it aims to ensure the following:

- Compliance with the conditions set in the ECC;
- Compliance with the Environmental Management Plan (EMP) commitments;
- Effectiveness of environmental measures on prevention or mitigation of actual project impacts vis-a-vis the predicted impacts used as basis for the EMP design; and
- Continuous updating of the EMP for sustained responsiveness in addressing the environmental impacts of undertakings.

**(2) Roles and Responsibilities**

**a) Project Proponent/Company**

Proponents that have been issued ECCs are primarily responsible for monitoring their projects. A proponent is required to submit an ECC Compliance Monitoring Report (CMR) to the designated monitoring EMB office on a semi-annual frequency. The detailed report on compliance to environmental standards specific to environmental laws shall be submitted through the Self-Monitoring Report (SMR) on a quarterly basis to the concerned EMB office.

**b) Multi-partite Monitoring Team (MMT)**

The MMT is recommendatory to EMB and has the primary responsibility of validating the proponent's environmental performance.

MMTs are organized, if required in the ECC, especially for ECPs to encourage public participation, to promote greater stakeholder vigilance and to provide appropriate check and balance mechanisms in the monitoring of the environmental impacts of project implementation. MMTs have the primary responsibility of validating the proponent's environmental performance, with the following specific functions:

- i. Validate project compliance with the conditions stipulated in the ECC and the EMP;
- ii. Validate the Proponent's conduct of self-monitoring;
- iii. Receive complaints, gather relevant information to facilitate determination of the validity of complaints or concerns about the project and timely transmit to the Proponent and EMB recommended measures to address the complaint;
- iv. Prepare, integrate and disseminate simplified validation reports to community stakeholders;
- v. Make regular and timely submission of MMT Reports based on the EMB-prescribed format.

The Compliance Monitoring and Validation Report (CMVR) shall be submitted semi-annually to the concerned EMB Regional Office, with the Proponent's CMR/SMR as an attachment. Moreover, the second CMVR shall preferably present a qualitative desk validation of the trend analysis report and cumulative environmental performance of the Proponent.

**c) EMB**

The Environmental Management Bureau shall be primarily responsible for the over-all evaluation/audit of the Proponent's monitoring and the MMT's validation.

Table 10.1-10 summarizes the monitoring, validation and evaluation/audit schemes undertaken by the monitoring entities above.

**Table 10.3-7 Monitoring, Validation and Evaluation/Audit Schemes**

Monitoring Aspects		Frequency / Timing		
		Proponent Monitoring	Self-Monitoring	MMT Validation of Proponent's Performance
A. Compliance Reporting	ECC	Semi-annual in CMR	Semi-annual in CMVR	Semi-annual in CER
	EMP <sup>1</sup>	Semi-annual in CMR	Semi-annual in CMVR	Semi-annual in CER
	Environmental Standards (under specific environmental laws)	Detailed report in Quarterly SMR; Summary of compliance in semi-annual CMR	Semi-annual in CMVR	Semi-annual in CER
B. Field Validation		-	Semi-annual	Semi-annual, or whenever there are complaints, failure to comply with standards or suspicious data
C. Effectiveness of Environmental Management Measures	Sampling and Measurement	Monthly/ Continuous as committed to in the Environmental Monitoring Plan within the EMP	Only in cases of complaints, failure to comply with standards or Suspicious data	As the need arises in coordination with the MMT
	Trend Analysis/ Cumulative Performance Report	2nd semi-annual CMR; 4th Quarter SMR	2nd semi-annual CMVR	2nd semi-annual CER

Source: DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), Revised Procedural Manual (2007)

Note:

- a) The EMP (Environmental Management Plan) is composed of the Impacts Management Plan, the Social Development Plan, and the Information, Education and Communication (IEC) Plan,
- b) CMVR has the Proponent's CMR/SMR as an attachment
- c) The Compliance Evaluation Report (CER) is prepared by the EMB Case Handler/staff and shall be attached to the Proponent's CMR/SMR and MMT's CMVR
- d) The composite EMB Team (if project has no MMT) conducts validation, or if the Proponent has an existing MMT, the EMB personnel undertake validation as a member of the MMT. Should a composite team be needed to address a mix of issues within the respective mandate of the EMB divisions/units, the EMB composite team shall join the particular MMT validation activity so that there is only one integrated group validating the issues.
- e) Trend Analysis is undertaken on key significant environmental parameters in relation to standards while a Cumulative Performance Report is done on applicable key significant impacts and measures.

**8) Comparison of PEISS and JICA Guidelines/World Bank (WB) Safeguard Policies**

In comparison to the JICA Guidelines and World Bank Operational Policy 4.01 - Environmental Assessment (hereafter referred to as WB OP 4.01), there are no variances in terms of the objectives of the JICA Guidelines/WB OP 4.01 and the Philippines' goal as provided in its constitution, environmental policies, EIS system law, and local government code.

**10.3.2 Other Environmental Laws and Regulations Concerning the Project**

Major environmental laws and regulations, which may be relevant to the interchange projects, must be observed. The PEISS states obligations to strictly comply with the environmental laws, regulations and standards which have been established by the Philippine government. When project type, location, scale,



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and magnitude of potential impacts are clarified, all concerning laws and regulations should be identified to examine the requirements.

**1) Environment Code, Presidential Decree No. 1152**

Known as the Philippine Environment Code, it launches a comprehensive program on environmental protection and management. It also provides for air, water quality, land use, natural resources and waste management for fisheries and aquatic resources; wildlife; forestry and soil conservation; flood control and natural calamities; energy development; conservation and utilization of surface and ground water and mineral resources.

**2) Water Code, Presidential Decree No. 1067**

This is a decree instituting a water code which revised and consolidated the laws governing the ownership, appropriation, utilization, exploitation, development, conservation and protection of water resources.

**3) Clean Water Act, Republic Act 9275**

An Act which aims to protect the country's water bodies from pollution from all possible sources (industrial, commercial, agricultural and household activities). It provides for a comprehensive and integrated strategy to prevent and minimize pollution through a multi-sectoral and participatory approach involving all the stakeholders.

**4) Clean Air Act of 1999, Republic Act No. 8749**

This is an Act which lays down policies to prevent and control air pollution. The act sets standards for exhaust gas from vehicles, manufacturing plants and so on to follow. All potential sources of air pollution must comply with the provisions of the Act. As such, all emissions must be within the air quality standards set under the law. It also imposes appropriate punishments for violators of the law.

**5) Ecological Solid Waste Management Act, Republic Act No. 9003 (2000)**

This is an Act providing for an ecological solid waste management program, creating the necessary institutional mechanisms and incentives, declaring certain acts that are prohibited and providing penalties, appropriating funds therefore, and for other purposes.

**6) Pollution Control Law, Presidential Decree No. 984**

This is an Act that serves as the foundation for managing industrial activities which create impacts on air and water quality. It empowers the DENR to impose ex-parte cease and desist orders (CDO) on the grounds of immediate threat to life, public health, safety or welfare, or to animal or plant life when wastes or discharges exceed the normal.

**7) Forestry Reform Code, Presidential Decree No. 705**

The Forestry Reform Code of the Philippines recognizes that there is an urgent need for proper classification; management and utilization of the lands of the public domain to maximize their productivity to meet the demands of the increasing population of the Philippines. It surmises that to achieve the above purpose, it is necessary to reassess the multiple uses of forest lands and resources before allowing any utilization in order to optimize the benefits that can be derived. It also emphasizes not only the utilization but more so the protection, rehabilitation and development of forest lands to ensure the continuity of their productive condition.

### 10.3.3 Legal and Institutional Framework for Social Considerations

#### 1) Laws and Regulations on Social Considerations

The policy framework governing Resettlement Action Plans for Structures and Land is derived from the Philippine Constitution, Republic Act (RA) 8974, RA 8371 or the Indigenous Peoples' Rights Act, Environmental and Social Safeguards Policies of the financing institutions and other applicable laws. Various provisions and prescriptions of laws, policies and guidelines governing the operation and implementation of resettlement action plans and safeguards for indigenous peoples are listed below.

##### (1) 1987 Constitution of the Republic of the Philippines

The national basic policy on land acquisition and involuntary resettlement is based on the following articles. Article III, Bill of Rights, Section 1: "No person shall be deprived of life, liberty, or property without due process of law, nor shall any person be denied the equal protection of the laws". Article III, Bill of Rights, Section 9: "Private property shall not be taken for public use without just compensation."

Article XIII, Urban Land Reform and Housing, Section 9: "The State shall, by law, and for the common good, undertake, in cooperation with the private sector, a continuing program of urban land reform and housing which will make available at affordable cost, decent housing and basic services to under-privileged and homeless citizens in urban centers and resettlement areas. It shall also promote adequate employment opportunities to such citizens. In the implementation of such program the State shall respect the rights of small property owners."

Article XIII, Urban Land Reform and Housing, Section 10: "Urban or rural poor dwellers shall not be evicted nor their dwelling demolished, except in accordance with law and in a just and humane manner. No resettlement of urban or rural dwellers shall be undertaken without adequate consultation with them and the communities where they are to be relocated."

##### (2) RA 7160- Local Government Code of 1991

According to Section 19, the power of eminent domain may not be exercised unless a valid and definite offer has been previously made to the owner, and such offer was not accepted. The local government unit may immediately take possession of the property upon the filing of the expropriation proceedings and upon making a deposit with the proper court of at least fifteen percent (15%) of the fair market value of the property based on the current tax declaration of the property to be expropriated, and further, the amount to be paid for the expropriated property shall be determined by the proper court, based on the fair market value at the time of the taking of the property.

##### (3) RA 7279- Urban Development and Housing Act of 1992

The mandate of RA 7279 is to uplift the conditions of the underprivileged and homeless citizens in urban areas and in resettlement areas by making available to them decent housing at affordable cost, basic services, and employment opportunities. Also, the act provides for an equitable land tenure system that shall guarantee security of tenure to Program beneficiaries but shall respect the rights of small property owners and ensure the payment of just compensation.

Eviction or demolition may be allowed under the following situations:

- When persons or entities occupy dangerous areas such as esteros, railroad tracks, garbage dumps, riverbanks, shorelines, waterways, and other public places such as sidewalks, roads, parks, and playgrounds.
- When government infrastructure projects with available funding are about to be implemented.
- When there is a court order for eviction and demolition.

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Section 21: Basic Services. Socialized housing or resettlement areas shall be provided by the LGUs or the National Housing Authority (NHA) in cooperation with the private developers and concerned agencies with the following basic services and facilities: (a) Potable water; (b) Power and electricity and an adequate power distribution system; (c) Sewerage facilities and an efficient and adequate solid waste disposal system; and (d) Access to primary roads and transportation facilities.

The provision of other basic services and facilities such as health, education, communication, security, recreation, relief and welfare shall be planned and shall be given priority for implementation by the local government unit and concerned agencies in cooperation with the private sector and the beneficiaries themselves.

**(4) RA 8974: An Act to Facilitate the Acquisition of Right-of-Way, Site, or Location for National Government Infrastructure Projects and for Other Purposes**

RA 8974 establishes a uniform basis for determining just compensation for immediate possession of the property involved in eminent domain proceedings. Section 4 Guidelines for Expropriation Proceedings: Whenever it is necessary to acquire real property for the ROW or location for any national government infrastructure project through expropriation, the appropriate implementing agency shall initiate the expropriation proceedings before the proper court under the following guidelines:

- i) the agency shall immediately pay the owner of the property the amount equivalent to the sum of one hundred percent (100%) of the value of the property based on the current relevant zonal valuation of the Bureau of Internal Revenue (BIR); and the value of the improvements and/or structures;
- ii) where there is no zonal valuation, the BIR is mandated within the period of 60 days from the date of the expropriation case to come up with the zonal valuation of the area;
- iii) if there is no existing valuation, the implementing agency shall immediately pay the owner its proffered value based on standards as follows:

Section 5: Standards for the Assessment of the Value of the Land Subject to Expropriation Proceedings or Negotiated Sale:

- i) Classification and use for which property is suited;
- ii) The development costs for improving the land;
- iii) The value declared by the owners;
- iv) The current selling price of similar lands in the vicinity;
- v) The reasonable disturbance compensation for the removal or demolition of certain improvements on the land and for the value of improvements;
- vi) The size, shape or location, tax declaration and zonal valuation of the land.

Section 9, Squatter Relocation: The government through the NHA, in coordination with the LGUs and implementing agencies concerned, shall establish and develop squatter relocation sites, including the provision of adequate utilities and services, in anticipation of squatters that have to be removed from the right-of-way or site of future infrastructure projects. Whenever applicable, the concerned local government units shall provide and administer the relocation sites.

**(5) Indigenous Peoples' Rights Act (IPRA) of 1997**

The IPRA sets conditions, requirements, and safeguards for plans, programs, and projects affecting Indigenous Peoples (IPs). It spells out and protects the rights of IPs. The important provisions of the IPRA are:

- i) The right to their ancestral domains (Chapter III, Section 11);

- ii) The right to an informed and intelligent participation in the formulation and implementation of any project, government or private, that will impact upon their ancestral domains (Chapter III, Section 7b);
- iii) The right to participate fully, if they so choose, at all levels of decision-making in matters which may affect their rights, lives and destinies through procedures determined by them (Chapter IV, Section 16);
- iv) The right to receive just and fair compensation for any damages inflicted by or as a result of any project, government or private (Chapter III, Section 7b);
- v) The right to stay in their territory and not to be removed from that territory. If relocation is necessary as an exceptional measure, it can only take place with free and prior informed consent of the IPs and Indigenous Cultural Communities (ICCs) concerned (Chapter III, Section 7c);
- vi) The right to be secure in the lands to which they have been resettled (Chapter III, Section 7d);
- vii) The right to determine and decide their own priorities for the lands they own, occupy, or use (Chapter IV, Section 17);
- viii) The right to maintain, protect, and have access to their religious and cultural sites (Chapter IV, Section 33);
- ix) The IPRA also created the National Commission on Indigenous Peoples (NCIP) to carry out the policies set forth in the IPRA. The NCIP has issued a number of orders that puts into operation the provisions of the IPRA; the most important for the purposes of this policy is NCIP Administrative Order No. 1 or the Free and Prior Informed Consent Guidelines of 2006.

## **2) Responsible Government Authorities**

There is no government authority in charge to specialize in the land acquisition and resettlement in the Philippines. Therefore, the project competent authorities independently handle the land acquisition and resettlement. In addition to DPWH, the following authorities have the opportunity to implement the ROW acquisition. However, only DPWH has developed its own guidelines and manuals. Other authorities are said to just follow the DPWH procedures and international donors' safeguard policies.

- National Housing Authority
- National Power Corporation
- Transmission Corporation
- National Irrigation Administration
- Department of Agrarian Reform

## **3) Comparison of Philippines Policies and JICA Guidelines/WB Safeguard Policies on Involuntary Resettlement**

A comparison of the Philippine and JICA Guidelines/ WB Safeguard Policies on resettlement and compensation was undertaken. The principles of the JICA Guidelines are fundamentally harmonized with WB Safeguard Policies. Table 10.1-11 summarizes the comparison of relevant regulations in the Philippines and the JICA Guideline/WB Policies on involuntary resettlement.

**Table 10.3-8 Comparison of Relevant Regulations in the Philippines and the JICA Guideline/World Bank Policies on Resettlement**

JICA Guidelines/World Bank OP4.12	Laws of the Philippines	Comparison/Gaps	Policy and/or Recommendations to bridge the Gaps
<p>Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures to minimize impact and to compensate for losses must be agreed upon with the people who will be affected.</p>	<p>No person shall be deprived of life, liberty, or property without due process of law, nor shall any person be denied the equal protection of the laws (Constitution of the Republic of the Philippines, Article III, Section 1). The right to stay in their territory and not to be removed from that territory is to be protected. If relocation is necessary as an exceptional measure, it can only take place with free and prior informed consent of the IPs and ICCs concerned (IPRA of 1997, Chapter III, Section 7c)</p>	<p>There are no directly corresponding provisions in the laws and regulations of the Philippines, but no significant deviations are observed in the Philippines' policies on involuntary resettlement.</p>	<p>-</p>
<p>For projects that will result in large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.</p>	<p>A Land Acquisition Plan and Resettlement Action Plan (LAPRAP) shall be prepared for all projects, whether local or foreign funded, that will require ROW acquisitions, using a standardized compensation package (Department Order No.5, 2003). The LAPRAP document shall describe the project, expected impacts and mitigating measures, socio-economic profile of APs, compensation package, timetable of implementation, institutional arrangements, participation, consultation and grievance procedures (Infrastructure Right Of Way Procedural Manual, 2003).</p>	<p>There are no government laws or regulations to stipulate preparation of RAP in the Philippines.</p>	<p>The Project Resettlement Policy is in line with WB OP4.12 and JICA guidelines.</p>
<p>Compensation must be based on the full replacement cost as much as possible.</p>	<p>Zonal value as the first offer: If the mode of acquisition is through a negotiated sale, the first offer shall be the zonal value of the particular land where the property is located, as determined by the BIR. If the owner rejects the first offer, the DPWH shall renegotiate using the values recommended by the Appraisal Committee or Independent Land Appraiser (ILA) as a guide for negotiation (RA 8974)</p>	<p>The BIR zonal valuation is determined based on the past records of land sales and so differs from ILA valuation.</p>	<p>The Project Policy on compensation is based on the full replacement cost in line with WB OP4.12 and JICA guidelines.</p>

JICA Guidelines/World Bank OP4.12	Laws of the Philippines	Comparison/Gaps	Policy and/or Recommendations to bridge the Gaps
<p>Appropriate participation by affected people and their communities must be promoted in the planning, implementation and monitoring of resettlement action plans and measures to prevent the loss of their means of livelihood. In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance.</p>	<p>The information campaign will also convey to the PAFs the available channels for complaints and grievances and related procedures. In this respect the PAFs will be informed that grievances from the PAFs related to LARRIPP implementation or any aspect of the project will be handled through negotiations and are aimed at achieving consensus (LARRIPP, 2007). The women, children, and elderly who are among the PAFs shall likewise be consulted and mobilized to participate in the consultation meeting and discuss with them the socio-cultural implication of the Resettlement Action Plan (LARRIPP, 2007).</p>	<p>There are no government laws or regulations on public participation in the Philippines.</p>	<p>The Project Resettlement Policy is in line with WB OP4.12 and JICA guidelines.</p>
<p>People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.</p>	<p>Other types of assistance and entitlements other than compensation for land and lost assets include disturbance compensation, income loss, inconvenience allowance, rehabilitation assistance, rental subsidy and transportation allowance or assistance (LARRIPP, 2007).</p>	<p>There are no government laws or regulations on livelihood recovery in the Philippines.</p>	<p>The Project Resettlement Policy is in line with WB OP4.12 and JICA guidelines.</p>
<p>After projects begin, project proponents etc. monitor whether any unforeseeable situations occur and whether the performance and effectiveness of mitigation measures are consistent with the assessment's prediction. Project proponents etc. should make efforts to make the results of the monitoring process available to local project stakeholders.</p>	<p>The main objective of monitoring the implementation of the RAFs is to see whether or not the RAFs are being carried out in accordance with the LARRIPP. This involves the monitoring of land acquisition, payment of compensation for lost assets, and resettlement of persons severely affected by the project. Internal and external monitoring shall be conducted regularly. The External Monitoring Agent shall include during the monitoring, the results of the disclosure of the LARRIPP, RAP to the PAFs during the public consultation conducted for each project contract package (LARRIPP, 2007).</p>	<p>There are no government laws or regulations on monitoring and evaluation in the Philippines.</p>	<p>The Project Resettlement Policy is in line with WB OP4.12 and JICA guidelines.</p>

Source: JICA Study Team based on the information provided by JICA

## 10.4 Environmental and Social Considerations for the Priority Project

### 10.4.1 Priority Project Description

Option C has been selected as the priority project shown in Table 10.4-1. The main features of the priority project are listed in Table 10.4-2.

**Table 10.4-1 Selected Priority Project**

Zone	Phase	Terminal	Description
Inside of Manila	Phase I	EDSA – Caloocan	The route utilizes the existing PNR route from Caloocan to EDSA Station.
Outside of Manila		Caloocan – Malolos	The route utilizes the same alignment as the Northrail Project Phase I.
	Phase II	Malolos - Clark	

Source: JICA Study Team

**Table 10.4-2 Technical Features of Priority Project**

No	Features	Description
1	Route plan and station location	Refer to Section 6.2.4 (Figure 6.2-32: Option C)
2	Train operation plan	Refer to Section 6.3.5
3	Railway system <ul style="list-style-type: none"> <li>• Rolling stock</li> <li>• Signals/telecommunications</li> <li>• Power supply</li> <li>• Tracks</li> <li>• Depot</li> <li>• Substation</li> </ul>	Refer to Section 6.4 Refer to Sections 7.2.2 and 7.2.3 Refer to Section 7.2.1 Refer to Section 7.2.4 Refer to Section 7.2.5 Refer to Section 7.2.1 (Figure 7.2-3)
4	Project implementation schedule and phasing	Refer to Section 8.2
5	Construction plan	Refer to Section 8.4
6	Project implementation cost	Refer to Section 8.5

Source: JICA Study Team

### 10.4.2 EIA requirement for AER Project

Option C utilizes the same route as the Northrail Project. Table 10.4-3 shows the status of ECC for the Northrail Project. The ECCs have been issued from DENR-EMB for Phase I Sections 1 and 2, i.e., between Caloocan and Clark, and valid till March 2014. On the other hand, there is no ECC between Caloocan to EDSA, i.e., a portion of the AER project.

**Table 10.4-3 Selected Priority Projects**

Northrail Project	Segment	ECC	AER F/S
Phase I	Section 2	Clark - Calumpit	CIA → Phase II ← Malolos
		Calumpit - Malolos	
	Section 1	Malolos - Valenzuela	Malolos → Phase I ← EDSA
		Valenzuela - Caloocan	
Phase III	-	Caloocan - Fort Bonifacion	No ECC

Source: JICA Study Team

Even when the validity of ECC is considered, a comprehensive EIA for the entire section of AER should be carried out as follows:

- The EIA report of the Northrail Project will be reviewed in accordance with the JICA Guidelines, and also revised based on the project features of AER, which are much different from those of the Northrail Project, for instance, traction power supply is electric versus diesel, tracks are elevated versus at grade, mixed operation versus commuter. Therefore, the potential adverse impacts will be much different; and
- The additional EIA study for the section between Caloocan to EDSA will be conducted since there is no ECC in this section.

The required EIA documents for ECC application should be confirmed with the DENR-EMB when the project scope is fixed in the F/S, because:

- According to PEISS (refer to Section 10.3.1), a project with viaducts and bridges totaling more than 10 km in length, or tunnels and sub-grade railways totaling more than 1.0 km in length is classified as ECPs and requires an EIS to apply for ECC. The Phase I project meets this criteria; and,
- According to JICA Guidelines, the project is classified as Category "A" due to the sensitive sectors (large-scale railways project) and the sensitive characteristics (large-scale involuntary resettlement).

#### **10.4.3 Requirement of RAP due to Additional Land Acquisition and Involuntary Resettlement**

##### **(1) Relocation Status of Informal Settler Families by Northrail Project**

Informal settlers have occupied a large part of the ROW of the old PNR line. The construction of Northrail on the old PNR tracks has required displacing these informal settlers. According to the information provided by Northrail, the relocated informal settler families are tabulated in Tables 10.4-4 and 10.4-5, and shown in Figures 10.4-1 and 10.4-2. Resettlement sites are also shown in Figures 10.4-1 and 10.4-2. The relocation program for Phase I Section 1 had been completed.

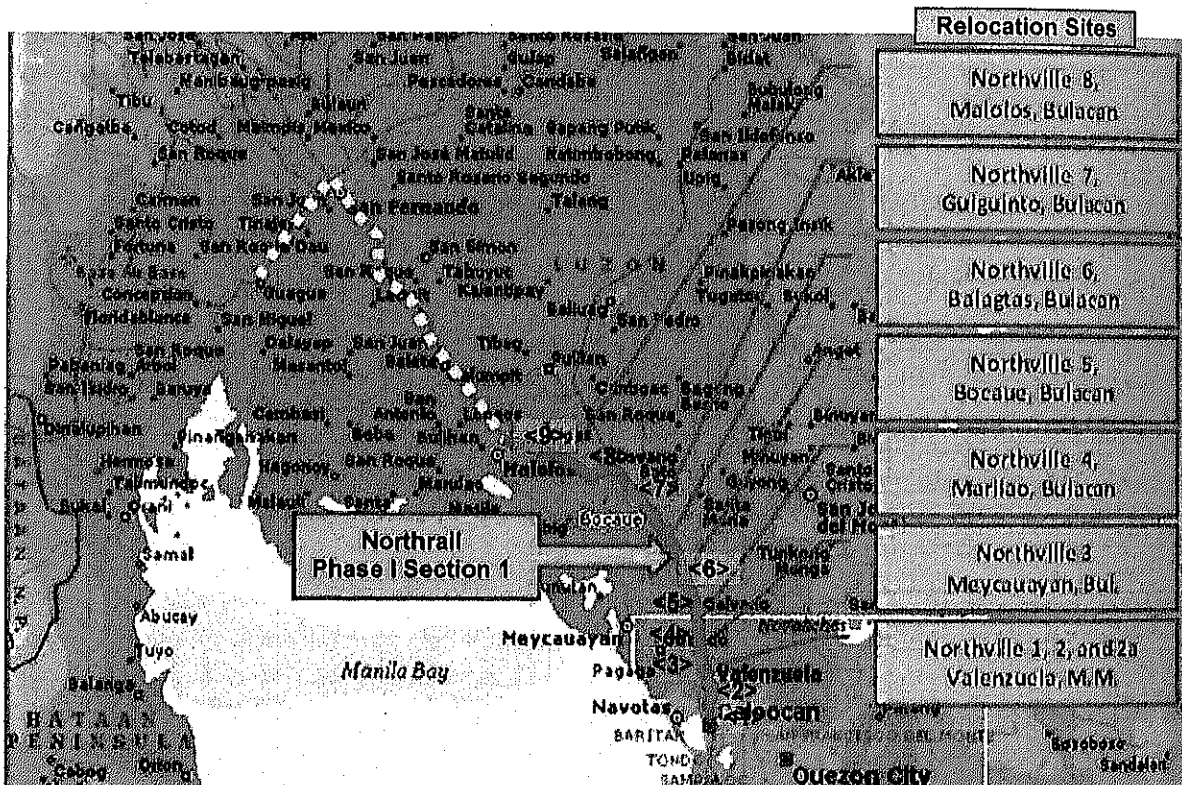


**Table 10.4-4 Relocation Status of Informal Settler Families Phase 1 Section 1 Northrail Project**

Location Number <sup>1)</sup>	City/Municipality	Relocated	Balance as of Mar. 2010	Phase in Priority Project
<1>	Calaoocan	632	0	} Phase I
<2>	Malabon	3,090	0	
<3>	Valenzuela	3,644	0	
<4>	Meycauyan	2,770	0	
<5>	Marilao	1,911	0	
<6>	Bocaue	2,043	0	
<7>	Balagtas	1,206	0	
<8>	Guiginto	1,702	0	
<9>	Malolos (Brgy. Tikay)	2,685	0	
-	TOTAL	19,683	0	-

Source: Northrail

Note: 1) The locations are indicated in Figure 10.4-1.



Source: Northrail

**Figure 10.4-1 Resettlement Sites under Northrail Project Phase I Section 1**

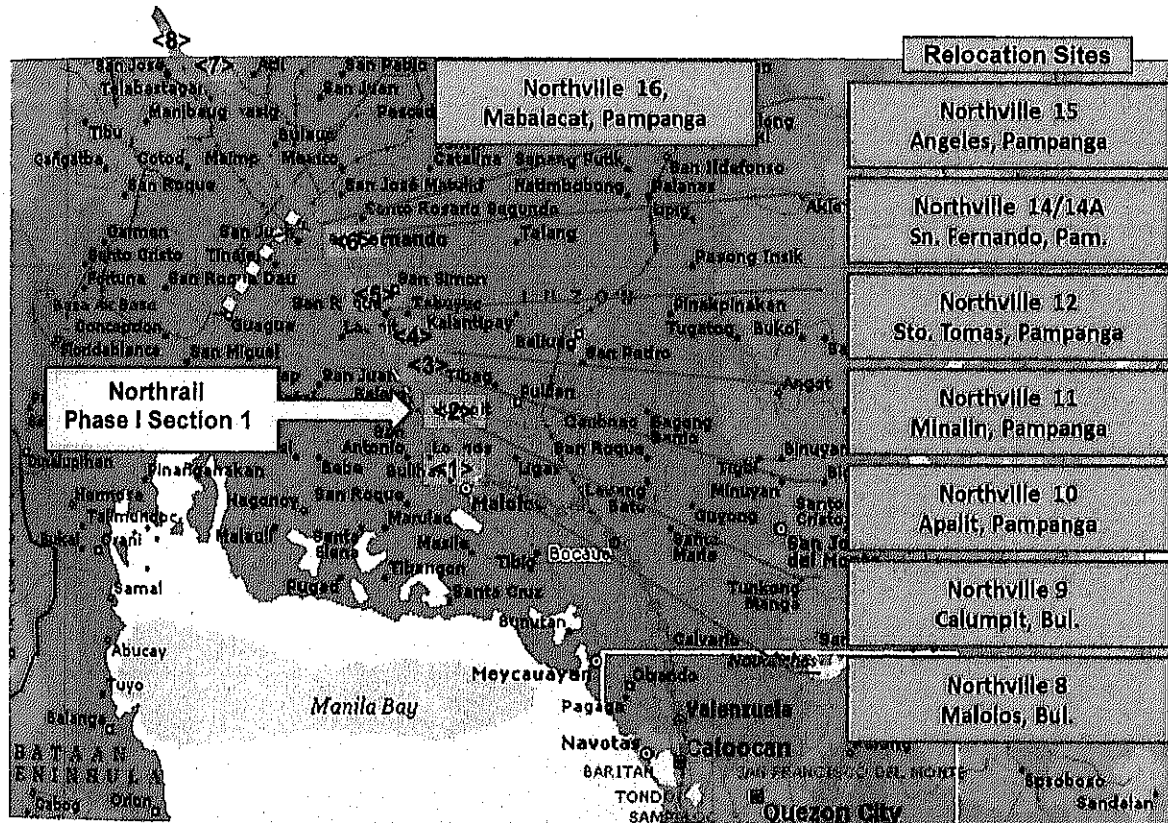
**Table 10.4-5 Relocation Status of Informal Settler Families Phase 1 Section 2 Northrail Project**

Location Number <sup>1</sup>	City/Municipality	Original Target	Revised Target	Relocated	Balance		Phase in Priority Project
					Dec. 2010 <sup>2</sup>	Dec. 2012 <sup>3</sup>	
<1>	City of Malolos	372	372	372	0	35	Phase II
<2>	Calumpit	2,031	1,321	755	566		
<3>	Apalit	817	827	827	0		
<4>	Minalin	63	123	123	0		
<5>	Sto. Tomas	507	507	507	0		
<6>	City of San Fernando	5,147	6,034	5,935	99	1,650	
<7>	Angeles City	2,752	3,499	3,303	196		
<8>	Mabalacat	5,754	5,754	2,012	3,742		
-	TOTAL	17,443	18,437	13,834	4,603	1,685	

Source: Northrail

Note:

- 1) The locations are indicated in Figure 10.4-3.
- 2) Relocation Status of Informal Settler Families As of August 2011 (based on the Special Concern Group Report dated 31 Dec. 2010)
- 3) Estimated by Northrail based on the required ROW with 15 m in width along the PNR route.



Source: Northrail

**Figure 10.4-2 Resettlement Sites under Northrail Project Phase I Section 2**

(2) Estimate of Affected Families by AER Project

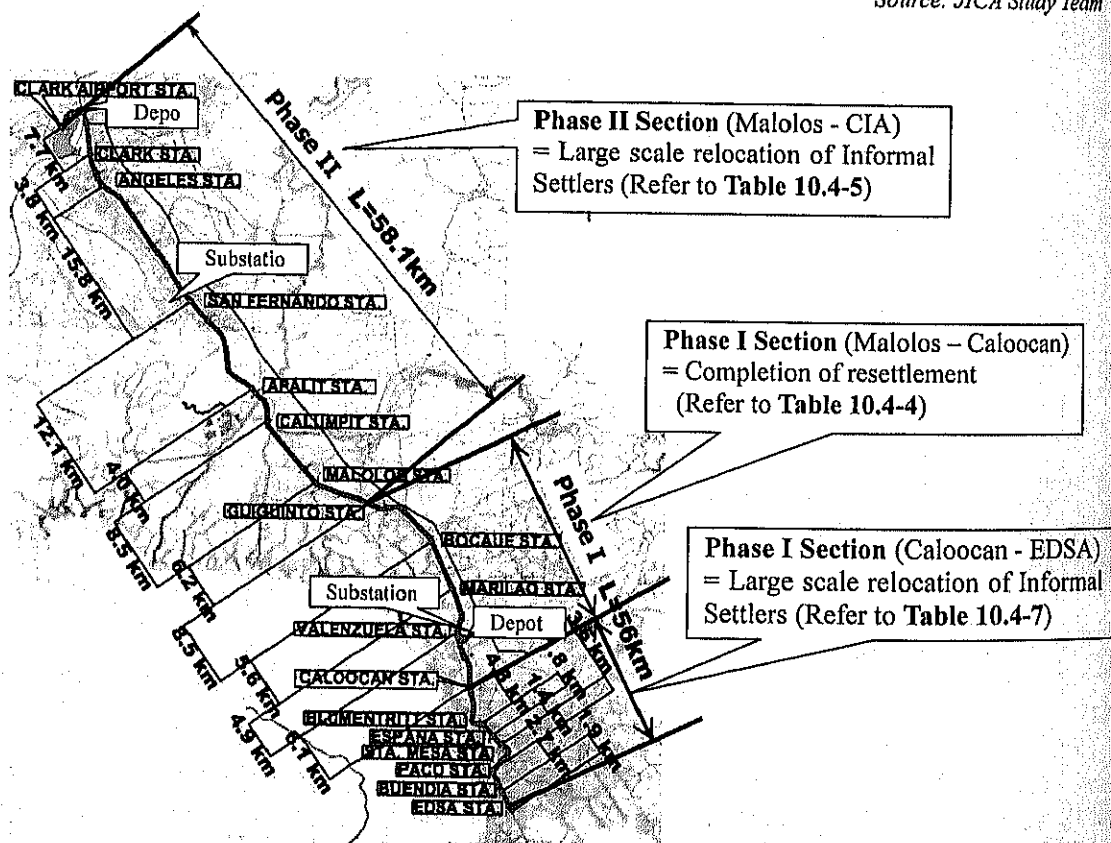
Table 10.4-6 shows the rough estimate of affected families due to the implementation of AER Phases I and II. Refer to Figure 10.4-3 for those locations. The estimate of the affected families between Caloocan and EDSA based on the result of the field reconnaissance conducted by the JICA Study Team and Northrail in January 2013 is listed in Table 10.4-7 and shown in Figure 10.4-4.

The RAP for all types of affected people, e.g., legal land and asset owners and businesses shall be drawn up in accordance with the WB safeguard policies and JICA Guidelines. The RAP shall also include the relocation plan for informal settlers. Although resettlement of informal settlers in Phase I Section 1 had been completed, Due Diligence of the relocation program should be undertaken in the F/S.

**Table 10.4-6 Additional Land Acquisition and Involuntary Resettlement**

Phase	Section	Additional Land Acquisition	Involuntary Resettlement	Informal Settlers in PNR ROW
Phase I	Track (EDSA - Caloocan)	Detailed study in F/S	plus x	About 1,600 families (Refer to Table 10.4-7 and Figure 10.4-4)
	Track (Malolos - Caloocan)	Detailed study in F/S	plus x	Completion of resettlement (Refer to Table 10.4-4)
	Station	Detailed study in F/S	plus x	Detailed study in F/S
	Depot	Detailed study in F/S. Northrail has leased 12 ha.	-	About 50 families
	Substation	Detailed study in F/S. Tentatively 2.2 ha at Valenzuela in the case of AC.	-	About 50 families
Phase II	Track (Malolos - CIA)	Detailed study in F/S	plus x	1,685 families; Estimated by Northrail based on the required ROW with 15 m in width (Refer to Table 10.4-5)
	Station	Detailed study in F/S	plus x	Detailed study in F/S
	Depot	Detailed study in F/S. Lease of 25 ha in BCDA property on the north side of CIA.	(Watermelon filed)	-
	Substation	Detailed study in F/S. Tentatively the old sugar factory of 2.47 ha at San Fernando in the case of AC.	-	-

Source: JICA Study Team



Source: JICA Study Team

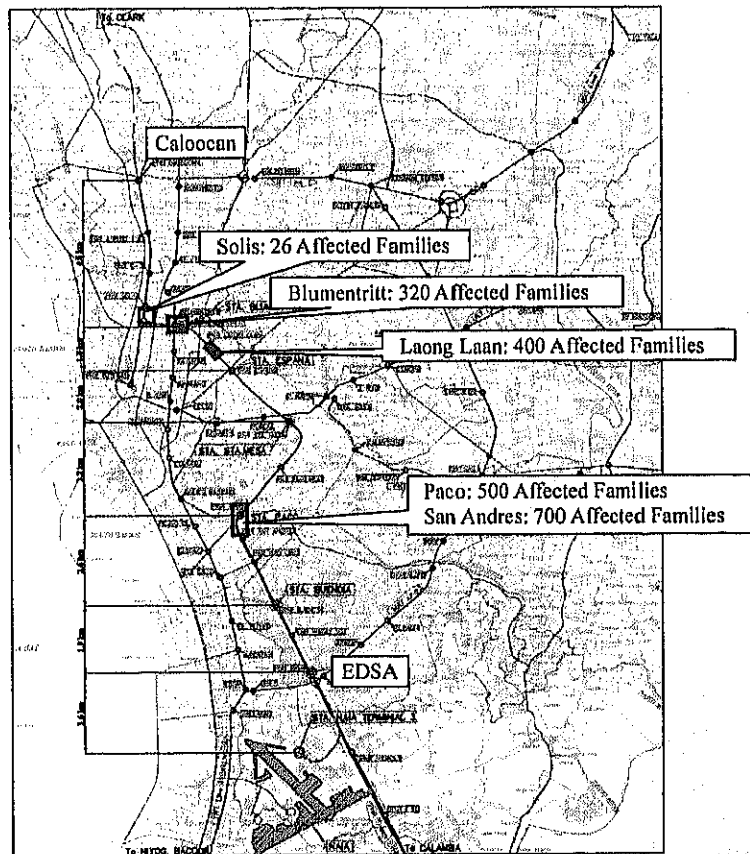
**Figure 10.4-3 Location Map of Involuntary Resettlement under the AER Project**

**Table 10.4-7 Estimate of Affected Families between Caloocan and EDSA**

AER Station	PNR Station	Estimate of Affected Families	Remarks
Caloocan	5th Avenue	0	-
	Hermosa	0	-
	Solis	26	In the vicinity of PNR T-junction
Blumentritt	Blumentritt	320	In the vicinity of Dimasalag Bridge (both sides)
	Laong Laan	(400) <sup>*1</sup>	To secure 15m-ROW between Laong Laan - España
España	España	0	-
Sta. Mesa	Sta. Mesa	0	-
	Pandacan	0	-
Paco	Paco	500	Apartments of previously relocated informal settlers between Paco and San Andres within ROW
	San Andres	700	Apartments of previously relocated informal settlers between San Andres and Vito Cruz within ROW
	Vito Cruz	0	-
Buendia	Buendia	0	Underground
	Pasay Road	0	Underground
EDSA	EDSA	0	Underground
<b>TOTAL</b>	-	<b>1,546<sup>*1</sup></b>	Approximately 1,600 when squatters under bridges and along the perimeter fence are included.

Source: JICA Study Team

Note: 1) The total does not include the affected families between Laong Laan and Espana.



**Figure 10.4-4 Location Map of Involuntary Resettlement inside Metro Manila**

#### 10.4.4 Draft Scoping

In accordance with the JICA Guidelines, draft scoping for the selected priority project was conducted based on the information on the proposed route and shown in Table 10.4-8. An outline of Terms of Reference (TOR) for the EIA and RAP surveys in the F/S was drafted on the potential adverse impacts (refer to Appendix D3).

**Table 10.4-8 Draft Scoping for Selected Priority Project**

No	Items	Rating		Brief Description
		Construction Phase	Operation Phase	
<b>Social Environment</b> *Regarding the impacts on "Gender" and "Children's Rights", might be related to all the criteria of the Social Environment.				
1	Involuntary Resettlement	A-	D	<p><b>【Pre-construction】</b></p> <p>(-) Informal settlers have occupied the following areas in the existing PNR ROW, therefore large scale relocation will be unavoidable.</p> <ul style="list-style-type: none"> <li>• Along the CIA at Mabalacat</li> <li>• Cities of San Fernando and Angels</li> <li>• Calumpit</li> </ul> <p>(-) Relocation of informal settlers will be also unavoidable within the proposed sites for the depot and substation at Valenzuela.</p> <p>(-) Involuntary resettlement is unavoidable due to additional land acquisition of for the narrow ROW sections and for all station areas.</p>
2	The poverty group	C	C	<p><b>【Pre-construction】</b></p> <p>Some of informal settlers might be considered as being in the poverty group.</p>
3	Indigenous and ethnic people	D	D	There are no indigenous or ethnic people in or around the project site.
4	Local economy such as employment and livelihood, etc.	B±	B±	<p><b>【Construction】</b></p> <p>(+)Employment of skilled and unskilled labor will be expected.</p> <p>(-) Land acquisition will force some small businesses to move out and might cause income loss and unemployment.</p> <p><b>【Operation】</b></p> <p>(+)Commuter trains may ease traffic congestion and boost regional economic activities along the route.</p> <p>(+)Commuter trains may increase citizen's convenience.</p> <p>(-)Resettlement and livelihood rehabilitation at the relocation site might take a longer period of time.</p>
5	Land use and utilization of local resources	D	B±	<p><b>【Operation】</b></p> <p>(+) Effective utilization of present unused land is anticipated due to new development in the surrounding area.</p> <p>(-) Uncontrolled land use might result in a loss of productive land.</p>
6	Social institutions such as social infrastructure and local decision-making institutions	B-	D	<p><b>【Pre-construction】</b></p> <p>(-) Conflict resolution between existing residents and new settlers might take longer in newly resettled barangays.</p>
7	Existing social infrastructures and services	B-	D	<p><b>【Construction】</b></p> <p>(-) Utility service interruption may inconvenience the communities.</p>
8	Misdistribution of benefits and damage	D	D	Misdistribution of benefits and damage will not be expected.
9	Local conflict of interests	D	D	Local conflict of interest will not be expected.

No	Items	Rating		Brief Description
		Construction Phase	Operation Phase	
10	Water Usage or Water Rights and Rights of Common	C	D	Water usage or water rights, rights of common may not be changed since the routes of the alternative options will be planned along the existing PNR route. <b>【Construction】</b> (-) Irrigation canals might be blocked by installing the piers and temporary access roads.
11	Historical /Cultural heritage	B-	D	<b>【Pre-construction】</b> (-) The old PNR Stations such as Paco are recognized as historical heritage sites and are considered for preservation.
12	Landscape	B-	B-	<b>【Construction】</b> (-) The express railway will employ mostly viaducts and bridges. Local aesthetic views might be disturbed temporarily during construction. <b>【Operation】</b> (-) Aesthetic value of the town scape might be affected due to viaducts.
13	Sunlight easement	D	B-	<b>【Operation】</b> (-) Elevated structures and viaducts might cause sunlight shadow over nearby residential areas.
14	Sanitation	B-	D	<b>【Construction】</b> (-)Sanitary conditions will become unfavorable if enough portable toilets and litter bins are not provided at the construction site.
15	Hazards (Risk) Infectious diseases such as HIV/AIDS	B-	D	<b>【Construction】</b> (-)Most construction workers will be hired locally. However, infectious diseases such as HIV/AIDS might be spread due to workers from outside and poor sanitary conditions.
<b>Natural Environment</b>				
16	Topography and Geological features	B-	D	<b>【Construction】</b> (-) Filling of swampy ground during construction will be needed for access roads to the construction sites. Temporary land alteration may be unavoidable. • No filling or cutting of slopes is expected during the construction in urban areas. <b>【Operation】</b> • Change of landform by soil erosion or landslide is not predicted.
17	Soil Erosion	B-	D	<b>【Construction】</b> (-) The PNR ROW has been scoured along Cultcut Creek and at the bank of Abacan River. Riverbank protection work will be needed before installing viaducts. (-) Construction work might cause soil erosion at borrow pits and quarries. Borrow pits and quarries are to be checked prior to construction work. <b>【Operation】</b> There will be no risk of soil erosion.
18	Groundwater	B-	B-	<b>【Construction】</b> Tunnel zone: (-)Digging of tunnels will be likely to cut off underground water veins and deteriorate the groundwater quality. <b>【Operation】</b> (-)Tunnels might affect the underground water flow.

No	Items	Rating		Brief Description
		Construction Phase	Operation Phase	
19	Hydrological Situation	C	C	<p><b>【Construction】</b> The route goes through the flood prone zone of Pampanga River Delta. Flooding and inundation might damage the railway facilities. Construction of piers for the long-span bridges in rivers might temporarily impact on the stream flow.</p> <p><b>【Operation】</b> Hydraulic effects on the river flow due to installation of piers should be checked.</p>
20	Flora, Fauna and Biodiversity	B-	D	<p><b>【Construction】</b> (-)There will be fewer access roads to the construction sites in swamp areas, temporary land alteration in swamp areas will be unavoidable. (-)Trees and vegetation within the construction limit might be removed.</p> <p><b>【Operation】</b> • No protected area is located in the vicinity of the railway route. • No endangered species of flora and fauna are observed in the vicinity of the route.</p>
21	Meteorology	D	D	No impacts are expected through the project activities.
22	Global Warming	B-	B+	<p><b>【Construction】</b> (-)The operation of construction machines and vehicles will emit CO<sub>2</sub> temporarily but the impact on global warming will be slight.</p> <p><b>【Operation】</b> (+)The project may contribute to the ease of traffic congestion and decrease of CO<sub>2</sub> emission.</p>
<b>Pollution Control</b>				
23	Air Pollution	B-	B+	<p><b>【Construction】</b> (-)Emission of pollutants due to the operation of construction machines and vehicles might slightly deteriorate the ambient air quality.</p> <p><b>【Operation】</b> (+)The project may contribute to the ease of traffic congestion and decrease of air polluting emissions.</p>
24	Water Pollution	B-	B-	<p><b>【Construction】</b> (-)Surface water, such as swamps, rivers and creeks will be likely to be deteriorated by suspended solids discharged from construction sites. (-) Alkaline drainage from concrete poring will increase pH level of surface water. (-)Discharge of oil and grease emitted from ill-serviced construction machines, heavy vehicles and wastewater from the site might degrade river and creek water quality. (-)Piling work for installation of the long-span bridge piers will disturb bottom sediment and cause deterioration of water quality with suspended solids.</p> <p><b>【Operation】</b> (-) Untreated wastewater from stations and maintenance facilities in the Depot might deteriorate the surface water quality.</p>
25	Soil Contamination	B-	D	<p><b>【Construction】</b> (-) Oil and grease emitted from ill-serviced construction machines and heavy vehicles might contaminate soil at the construction site. (-) If the acquired land (e.g., brownfield sites) becomes contaminated with hazardous chemicals, remediation will be needed before commencing construction.</p>



No	Items	Rating		Brief Description
		Construction Phase	Operation Phase	
26	Waste	B-	B-	<p><b>【Construction】</b>                      (-) Construction work may generate solid waste such as removed soil and sand of the existing structures. Construction workers may also create additional garbage.</p> <p><b>【Operation】</b>                      (-) Improper disposal of solid waste from stations and maintenance facilities in the Depot might deteriorate the environmental quality of surrounding communities.</p>
27	Noise and Vibration	B-	B-	<p><b>【Construction】</b>                      (-) Noise and vibration due to construction activities and vehicles will be likely to affect the nearby communities.                      (-) Along detour routes, noise from increased vehicles may also affect the sound environment in the vicinity.</p> <p><b>【Operation】</b>                      (-) Noise and vibration will cause a nuisance along the route, especially for residential areas.</p>
28	Ground Subsidence	B-	B-	<p><b>【Construction】</b> Tunnel zone:                      (-) Digging of tunnels might affect the underground water flow and cause ground subsidence.</p> <p><b>【Operation】</b>                      (-) Tunnels might affect the underground water flow and cause ground subsidence.</p>
29	Offensive Odors	D	D	No impacts are expected through the project activities.
30	Bottom sediment	B-	B-	<p><b>【Construction】</b>                      (-) Piling work for installation of long-span bridge piers will disturb bottom sediment and cause adverse impacts on riverine organisms.                      (-) Discharge of oil and grease emitted from ill-serviced construction machines, heavy vehicles and water from the site might degrade bottom sediment quality.</p> <p><b>【Operation】</b>                      (-) Untreated wastewater from stations and maintenance facilities in the Depot might contaminate the sediments of rivers and swamps.</p>
Others				
31	Accidents	B-	B+	<p><b>【Construction】</b>                      (-) Traffic accidents are likely to occur due to the increase of construction vehicles.</p> <p><b>【Operation】</b>                      (+) No accidents are anticipated since tracks will be installed on viaducts and/or underground tunnels. There will be no level crossing.</p>

Source: JICA Study Team

**Rating:**

A±: Significant positive/negative impact is expected.

B±: Some positive/negative impact is expected.

C: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses.)

D: No impact is expected. IEE/EIA is not necessary.



### 10.4.5 Prediction and Assessment for Priority Project

On the basis of the results of the surveys, prediction and assessment of the IEE level was conducted for the items selected by draft scoping. Prediction of the magnitude of impacts and assessment based on the significance of impacts were conducted and are shown in Table 10.4-9.

The results of the prediction and assessment should be reviewed in the F/S with the progress of alignment and structure designs, and also based on the results of the baseline surveys.

**Table 10.4-9 Results of Prediction and Assessment for Priority Project**

Items	Prediction	Assessment	Rating by Assessment	
			Construction Phase	Operation Phase
<b>Social Environment</b>				
Involuntary Resettlement	<p><b>[Pre-construction]</b></p> <ul style="list-style-type: none"> <li>•Predicted affected informal settlers within the track ROW are more than a thousand families as shown in Tables 10.4-6 and 10.4-7.</li> </ul>	<p><b>[Pre-construction]</b></p> <p>(-) Large scale involuntary resettlement (more than 200 affected persons) will be unavoidable. Thus the adverse impact is considered to be significant.</p>	A-	D
The poverty group	<p><b>[Pre-construction]</b></p> <ul style="list-style-type: none"> <li>•Informal settlers include the poverty group.</li> </ul>	<p><b>[Pre-construction]</b></p> <p>(-) Since there will be many poor families to be relocated, an impact is expected to some extent.</p>	B-	D
Local economy such as employment and livelihood	<p><b>[Construction]</b></p> <ul style="list-style-type: none"> <li>•Hiring of unskilled labor (&gt;50%) and skilled labor (&gt;30%) from the vicinity of the project site (Republic Act No. 6685, 12 December 1988) is expected.</li> <li>•Additional land acquisition for the stations will force some small businesses to move out and might cause income loss and unemployment.</li> </ul> <p><b>[Operation]</b></p> <ul style="list-style-type: none"> <li>•The stakeholders suggested that commuter trains will boost regional economic activities and increase citizen's convenience along the route.</li> <li>•According to the information provided by LGUs during the stakeholder meetings, some relocated families had left the relocation sites. Their livelihood might be worsened due to relocation. Livelihood restoration might take a longer period of time if rehabilitation measures are not provided.</li> </ul>	<p><b>[Construction]</b></p> <p>(+) Employment of skilled and unskilled labor will bring positive impacts on the local economy to some extent.</p> <p>(-) Loss of income and unemployment will bring some adverse impacts on the local economy, but only temporarily.</p> <p><b>[Operation]</b></p> <p>(+) Commuter trains will boost regional economic activities and increase citizen's convenience along the route. Positive effects are expected to some extent.</p> <p>(-) If livelihood restoration takes a long period of time, the local economy might be depressed to some extent.</p>	B±	B±
Land use and utilization of local resources	<p><b>[Operation]</b></p> <ul style="list-style-type: none"> <li>•Although uncontrolled land use will be restricted by the LGU's zoning ordinance, urban sprawl might cause a loss of productive land.</li> <li>•Development of new station squares will be planned at some terminal stations.</li> </ul>	<p><b>[Operation]</b></p> <p>(-) Uncontrolled land use may result in the loss of productive land. Adverse impacts are anticipated to some extent.</p> <p>(+) Development of new station squares will trigger effective utilization of presently unused lands. Positive impacts are expected to some extent.</p>	D	B±
Social institutions such as local institutions	<p><b>[Pre-construction]</b></p> <ul style="list-style-type: none"> <li>•Since thousands of informal settlers need to be relocated, relocation sites will need to be prepared in several barangays. There will be some conflict between relocated people and the receiving communities in the newly resettled sites.</li> </ul>	<p><b>[Pre-construction]</b></p> <p>(-) If the conflict is not resolved, existing social institutions may be weakened. Adverse impacts are anticipated to some extent.</p>	B-	D

Items	Prediction	Assessment	Rating by Assessment	
			Construction Phase	Operation Phase
Water Usage or Water Rights and Rights of Common	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>The LGU at Bulacan indicated at the stakeholder meeting that irrigation canals would be blocked by installing the piers and temporary access roads.</li> </ul>	<p><b>【Construction】</b></p> <p>(-) Blockage of irrigation canals will influence local water usage but only temporarily during construction. Thus the adverse impact is not considered to be significant.</p>	B-	D
Existing social infrastructures and services	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>Utility services will be interrupted during construction in the urbanized areas along the PNR line.</li> </ul>	<p><b>【Construction】</b></p> <p>(-) Utility service interruption will cause inconvenience to the communities but only temporarily during construction. Therefore, the adverse impact is not considered to be significant.</p>	B-	D
Historical /Cultural heritage sites	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>The old PNR stations such as Paco and San Fernando are recognized as historical heritage sites, although those are not on the List of Historic Sites and Structures Installed with Historical Markers (Refer to Section 2.6 in Appendix D2)</li> </ul>	<p><b>【Construction】</b></p> <p>(-)The construction work will not damage the structures of the old PNR stations. Thus the adverse impact is not considered to be significant.</p>	B-	D
Landscape	<p><b>【Construction】 【Operation】</b></p> <ul style="list-style-type: none"> <li>There are neither landscape parks nor scenic zones along the proposed route. However, because the express railway will employ mostly viaducts and bridges, local scenic views might be deteriorated.</li> </ul>	<p><b>【Construction】</b></p> <p>(-)Local scenic views will be disturbed but only temporarily during construction. Thus, the adverse impact is not considered to be significant.</p> <p><b>【Operation】</b></p> <p>(-) Aesthetic value of the town scape might be affected due to erection of viaducts to some extent.</p>	B-	B-
Sunlight easement	<p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>Elevated structures and viaducts might cause sunlight shadow over nearby residential areas, especially inside of Metro Manila.</li> </ul>	<p><b>【Operation】</b></p> <p>(-) Although solar access is not considered to be an important issue in the Philippines, it might cause a problem, but only in the residential areas in Metro Manila. Thus adverse impacts are expected to some extent.</p>	D	B-
Sanitation	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>Sanitary conditions of the communities will be worsened due to the increase of waste and from the construction site.</li> </ul>	<p><b>【Construction】</b></p> <p>(-)Sanitary conditions of the communities might become unfavorable. Therefore, adverse impacts are expected to some extent.</p>	B-	D
Hazards (Risk) Infectious diseases such as HIV/AIDS	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>Infectious diseases such as HIV/AIDS could be spread due to construction workers from outside and poor sanitary conditions. However, most construction workers will be hired locally, therefore, spread of infectious diseases may not occur.</li> </ul>	<p><b>【Construction】</b></p> <p>(-) Although spread of infectious diseases is not expected, some cases might be observed, so negative impacts are expected to some extent.</p>	B-	D
<b>Natural Environment</b>				
Topography and Geological features	<p>➤ The route goes through liquefaction hazard areas in Pampanga delta (refer to Section 1.2 in Appendix D2).</p> <p><b>【Pre-construction】</b></p> <ul style="list-style-type: none"> <li>Although temporary land alteration due to filling of swampy ground will be unavoidable in swampy areas, no land slides or slope failures can occur.</li> </ul>	<p><b>【Pre-construction】</b></p> <p>(-) Based on the results of geological surveys, the design of structures will be checked with respect to soft ground and liquefaction, especially in swamp areas in the next F/S stage. Thus the adverse impacts are not considered to be significant.</p>	B-	D

Items	Prediction	Assessment	Rating by Assessment	
			Construction Phase	Operation Phase
Soil Erosion	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>•The PNR ROW has been scoured along Cultcut Creek and at the bank of Abacan River. Basement structures of viaducts will be eroded by the river flood flow.</li> <li>•Construction work might cause soil erosion at borrow pits and quarries.</li> </ul>	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>(-) Riverbank protection work will be implemented during construction.</li> <li>(-) Since borrow pits and quarries for this project will be already developed commercially available sites, the risk of soil runoff will be low.</li> </ul> <p>Thus, the adverse impacts are not considered to be significant.</p>	B-	D
Groundwater	<p>➤ The available information on the present conditions of groundwater was limited. Further survey will be needed in the F/S.</p> <p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>•Digging of tunnels will be likely to cut off underground water veins and deteriorate the groundwater quality.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>•Groundwater from deep wells is currently used by the industries in Makati City where the tunnels will be installed. However, it is not expected that the tunnels will affect the deep underground water flows. Shallow groundwater wells will be recovered after construction work.</li> </ul>	<p><b>【Construction】 Tunnel zone:</b></p> <ul style="list-style-type: none"> <li>(-) The risk of cut-off is low since tunnel boring will not completely block the underground water veins. Groundwater quality becomes slightly turbid but only temporarily during construction. Thus the adverse impacts is not considered to be significant.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>(-) Disturbance will be only temporary during construction, and therefore, the adverse impacts are not considered to be significant.</li> </ul>	B-	B-
Hydrological Situation	<p>➤ The route goes through the flood prone areas of Pampanga and Bulacan (refer to Section 1.3 in Appendix D2).</p> <p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>•Temporary facilities and access roads for construction work will block the flood flow in rivers and creeks and may cause overflow and inundation in the surrounding area.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>•Installation of piers may block the stream flow and raise the flood water level. The impediment of river flow shall be checked for the rivers where the bridge piers will be installed.</li> </ul>	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>(-)Construction work during the rainy season will be controlled to avoid flooding and inundation in the flood prone areas. Thus the adverse impacts are not considered to be significant.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>(-)The flood water levels are not expected to rise to the dangerous levels. Thus the adverse impacts are not considered to be significant.</li> </ul>	B-	B-

Items	Prediction	Assessment	Rating by Assessment	
			Construction Phase	Operation Phase
Flora, Fauna and Biodiversity	<p>➤ There are no protected areas located in the vicinity of the railway route (refer to Section 1.4 in Appendix D2).</p> <p>➤ No endangered species of flora or fauna are observed in the vicinity of the route. Since Candaba Swamp Conservation Area is about 5 km away from the existing NLEX highway, no adverse impacts on wildlife in protected area due to construction and operation are anticipated (refer to Section 1.5 in Appendix D2).</p> <p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>Although the route utilizes the existing PNR ROW, there will be few access roads to the construction sites in swamp areas. Land alteration in swamp areas will be needed and may disturb the swamp ecology.</li> <li>Trees within the construction limit will be removed.</li> </ul>	<p><b>【Construction】</b></p> <p>(-) Since land alteration in swamp areas will be only local and temporary, the adverse impacts will not be significant.</p> <p>(-) Trees and vegetation within the construction limit will be removed. Since clearing will be only limited inside of the ROW, the adverse impacts will not be significant.</p>	B-	D
Global Warming	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>The operation of construction machines and vehicles will emit a limited amount of CO<sub>2</sub> gas.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>Since travel demand will increase along the proposed corridor in the future, the modal shift in transportation of passengers from vehicles to railway will reduce CO<sub>2</sub> emission (refer to Chapter 5).</li> </ul>	<p><b>【Construction】</b></p> <p>(-) Emission of CO<sub>2</sub> gas from the operation of construction machines and vehicles will only be a small amount, thus have little impact on global warming.</p> <p><b>【Operation】</b></p> <p>(+) Since the modal shift will contribute to reduction of CO<sub>2</sub> emission, some positive effect on global warming is expected.</p>	B-	B+
<b>Pollution Control</b>				
Air Pollution	<p>➤ Present ambient air quality in Pampanga and Bulacan is good with air pollutant levels that were well below the National Ambient Air Quality Guidelines except for ozone, according to the measurement results (refer to Section 1.6 in Appendix D2).</p> <p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>Air pollutants (PM<sub>10</sub>, NO<sub>2</sub>) emitted from construction machines and heavy vehicles will only be a small amount.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>Travel demand will increase along the proposed corridor in the future. The modal shift in transportation of passengers from vehicles to railway will contribute to reduction of emission of air pollutants.</li> </ul>	<p><b>【Construction】</b></p> <p>(-) Since air pollutants emitted from construction machines and vehicles will only be a limited amount, pollution levels will not exceed the guideline values. However, dust generated by construction activities may cause a nuisance to neighboring communities. Thus adverse impacts are expected to some extent.</p> <p><b>【Operation】</b></p> <p>(+) Since the modal shift will contribute to abatement of air pollutant emissions, positive effects on ambient air quality are expected to some extent.</p>	B-	B+

Items	Prediction	Assessment	Rating by Assessment	
			Construction Phase	Operation Phase
Water Pollution	<p>➤ According to the measurement results, rivers and creeks in Pampanga and Bulacan have been contaminated with untreated wastewater. Although concentrations of heavy metals were well below the National Water Quality Criteria, the levels of organic compounds, nutrients and coliform exceeded the criteria (refer to Section 1.6 in Appendix D2).</p> <p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>• Turbid water discharged from construction sites such as piling work for installation of the long-span bridge piers will increase the concentration of Suspended Solids of the receiving water bodies.</li> <li>• Alkaline drainage from concrete poring will increase pH level of surface water.</li> <li>• Discharge of wastewater, oil and grease spilled from ill-serviced construction machines and heavy vehicles could degrade river and creek water quality.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>• Discharge of untreated wastewater from stations and maintenance facilities in the depot could make the water quality of the receiving water bodies worsen, especially due to organic compounds, nutrients and coliform.</li> </ul>	<p><b>【Construction】</b></p> <p>(-) Due to turbid water from construction sites, Suspended Solids of the receiving water bodies will temporary increase. However, since the levels will be controlled under the criteria, the adverse impacts will not be significant.</p> <p>(-) Since concrete poring will be only local and temporary, the increase of pH will not exceed the criteria of the receiving water bodies. Thus adverse the impacts will not be significant.</p> <p>(-) Water quality of receiving water bodies could deteriorate due to the oil/grease spillage, but only locally and temporarily during construction. Thus the adverse impacts will not be significant.</p> <p><b>【Operation】</b></p> <p>(-) Although effluent from stations and maintenance facilities will be treated at the respective wastewater treatment plants, water quality of the receiving water bodies may not satisfy the criteria. Adverse impacts are expected to some extent.</p>	B-	B-
Soil Contamination	<p>➤ Since the railway track will utilize the old PNR ROW, there is no record of brownfield sites.</p> <p>➤ One of the substations is planned at the old sugar factory in San Fernando in the case of AC. The land is not considered as a brownfield site.</p> <p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>• Spillage of oil and grease from ill-serviced construction machines and heavy vehicles could contaminate the soil.</li> <li>• Additional lands will need to be acquired for stations, depot and substations, and these lands might be contaminated with hazardous waste (e.g., brownfield sites).</li> </ul>	<p><b>【Construction】</b></p> <p>(-) Contaminated soil due to construction activities should be properly disposed of, but this will increase waste soil. Adverse impacts are expected to some extent.</p> <p>(-) If the acquired land becomes contaminated with hazardous waste, remediation will be needed before commencing construction. Thus adverse impacts are expected to some extent.</p>	B-	D

Items	Prediction	Assessment	Rating by Assessment	
			Construction Phase	Operation Phase
Waste	<p>➤ There are only a few controlled sanitary landfill sites in Metro Manila and the provinces. Most municipal solid waste is disposed of at the open dumpsites (refer to Section 2.8 in Appendix D2).</p> <p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>•Construction work will generate solid waste such as removed soil and debris from demolished structures, especially from the tunnel sections. Final disposal sites will be needed.</li> <li>•Construction workers will create additional garbage.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>•Solid waste from stations and industrial waste from the maintenance facilities in the Depot will be newly generated.</li> </ul>	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>(-) Waste soil generated from tunnels should be properly transported, disposed of and/or reused. Improper handling of waste soil may cause impacts on surrounding communities to some extent.</li> <li>(-) Solid waste left at construction sites could deteriorate the sanitary conditions of the construction sites and surrounding communities. Adverse impacts are expected to some extent.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>(-) Improper disposal of newly generated waste could deteriorate the environmental quality of surrounding communities. Adverse impacts will be expected to some extent.</li> </ul>	B-	B-
Noise and Vibration	<p>➤ Observed noise levels in Pampanga and Bulacan were within the permissible limits for the residential areas set by DENR (directly facing public transportation routes or an urban traffic artery). The daytime noise levels recorded ranged from 56 – 65 dB(A) and nighttime average noise ranged from 50 – 55 dB(A) (refer to Section 1.6 in Appendix D2).</p> <p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>•Noise and vibration due to construction machines and heavy vehicles will affect the nearby communities, especially due to piling work. The maximum noise level that shall be allowed from special construction activities measured at a distance of 30 meters from the noise source shall be 90 dB(A) for piling work and 85 dB(A) for rock drilling.</li> <li>•Along detour routes, noise from increased vehicles might slightly raise the sound levels of nearby communities.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>•Major noise sources due to train operations are wheel/rail rolling noise, vibration of viaduct structures and traction-motor fan (Fujimori et al., "Proposal of a Prediction for Noise of Conventional Railway", Journal of INCE/J Vol. 20 No.3, 1996). Estimated noise levels from trains over the elevated structures will not exceed the maximum permissible noise levels if noise abatement measures such as noise barriers are installed.</li> </ul>	<p><b>【Construction】</b></p> <ul style="list-style-type: none"> <li>(-) Although the noise levels due to construction activities will not exceed the maximum permissible limits, they may cause a nuisance to the nearby communities in the early morning and late evening. Adverse impacts are expected to some extent.</li> <li>(-) Increase of the noise level along detour routes will not exceed the maximum permissible limits. The adverse impacts will not be significant.</li> </ul> <p><b>【Operation】</b></p> <ul style="list-style-type: none"> <li>(-) Predicted noise levels will not exceed the maximum permissible limits for the residential areas. However, there will be some sections where the noise levels might be higher than the present conditions. Adverse impacts are expected to some extent. Furthermore, there are sections or contiguous areas which require quiet, such as areas within 100 meters from school sites, nursery schools, hospitals and special homes for the aged. In order to comply with the standards for these noise sensitive areas, noise abatement measures should be implemented.</li> </ul> <p>The noise levels should be predicted based on the detailed specifications for the rolling stock and structures in the F/S.</p>	B-	B-

Items	Prediction	Assessment	Rating by Assessment	
			Construction Phase	Operation Phase
Ground Subsidence	<p><b>【Construction】</b>            •Digging of tunnels could affect underground water veins and cause ground subsidence. The available information on the present condition of groundwater is limited. Further survey will be needed in the F/S.</p> <p><b>【Operation】</b>            •Since the structures such as viaducts will be built on soft ground in swampy areas, improperly designed structures could be affected by ground subsidence. Based on the results of the geological survey, the structures on soft ground will be properly designed by considering the underground water levels.</p>	<p><b>【Construction】</b>            (-)Digging of tunnels might affect the underground water veins. Adverse impacts on ground subsidence will be expected to some extent.</p> <p><b>【Operation】</b>            (-)The existence of tunnels might affect the underground water flow. Adverse impacts on ground subsidence will be expected to some extent.</p>	B-	B-
Bottom sediment	<p><b>【Construction】</b>            •Piling work for installation of long-span bridge piers is expected at river crossings, e.g., Pasig River. Disturbed bottom sediment will increase Suspended Solids and have an adverse impact on riverine organisms.            •Spillage of oil and grease from ill-serviced construction machines and heavy vehicles could degrade river and creek sediment quality.</p> <p><b>【Operation】</b>            •Since the effluent from stations and maintenance facilities at the Depot will be treated at the respective wastewater treatment plants, untreated wastewater is not expected to contaminate the sediments of rivers and swamps.</p>	<p><b>【Construction】</b>            (-) The level of Suspended Solids will be monitored and controlled during the bridge construction so as not to exceed the criteria. Adverse impacts will be expected to some extent.            (-) Spillage of oil and grease might be only locally and temporarily during construction. Thus the adverse impacts will not be significant.</p> <p><b>【Operation】</b>            (-) Since untreated wastewater will not be directly discharged into rivers or swamps, the adverse impacts on the sediments will not be significant.</p>	B-	B-
Others				
Accidents	<p><b>【Construction】</b>            •During construction, transport vehicles will pass through the residential areas in the vicinity of construction sites. The risk of traffic accidents will increase.</p> <p><b>【Operation】</b>            • Tracks will be installed on viaducts and/or underground tunnels. Since level crossings will be eliminated, accidents will be reduced or eliminated.</p>	<p><b>【Construction】</b>            (-)The risk of traffic accidents will increase due to the increase of construction and transport vehicles. Therefore adverse impacts are expected to some extent.</p> <p><b>【Operation】</b>            (+) Since there will be no level crossings, accidents will be diminished. Therefore positive impacts are expected to some extent.</p>	B-	B+

Source: JICA Study Team

**Rating:**

A±: Significant positive/negative impact is expected.

B±: Some positive/negative impact is expected.

D: No impact is expected. IEE/EIA is not necessary.

### 10.4.6 Outline of Mitigation Measures and Environmental Monitoring Plan

On the basis of the assessment results in Table 10.4-9, an outline of mitigation measures and corresponding monitoring plan is drafted on the potential adverse impacts in Tables 10.4-10 and 10.4-11 for the construction and operation, respectively.

The proposed mitigation measures and monitoring plan should be reviewed in the F/S with the progress of alignment and structure designs, and also based on the results of impact prediction and assessment.

**Table 10.4-10 Proposed Mitigation Measures and Monitoring Plan for Construction Phase**

Potential Impacts	Mitigation Measures	Monitoring Program	Implementation Responsibility
<b>Social Environment</b>			
<ul style="list-style-type: none"> <li>•Relocation of Informal Settlers</li> <li>•Land acquisition and resettlement</li> </ul>	<ul style="list-style-type: none"> <li>•The RAP shall be prepared for all types of affected people and assets due to additional land acquisition in accordance with the JICA Guidelines and WB safeguard policies.</li> <li>•The RAP shall also include the relocation plan for informal settlers.</li> </ul>	<ul style="list-style-type: none"> <li>•The monitoring plan shall be described in the RAP.</li> <li>•Internal and external monitoring teams shall be formulated.</li> </ul>	<ul style="list-style-type: none"> <li>•DOTC/PMO/PNR, Local Inter- Agency Committee (NHA, PCUP and other national agencies and LGUs), RAP consultant</li> </ul>
<ul style="list-style-type: none"> <li>•Restoration of income loss</li> <li>•Livelihood and living status</li> </ul>	<ul style="list-style-type: none"> <li>•Refer to "Land acquisition and resettlement"</li> </ul>	<ul style="list-style-type: none"> <li>•Refer to "Land acquisition and resettlement"</li> </ul>	<ul style="list-style-type: none"> <li>•Refer to "Land acquisition and resettlement"</li> </ul>
<ul style="list-style-type: none"> <li>•Identity of Community</li> <li>•Conflict Resolution</li> </ul>	<ul style="list-style-type: none"> <li>•Reflect the opinions and comments obtained through Public Consultations in the draft RAP</li> </ul>	<ul style="list-style-type: none"> <li>•Refer to "Land acquisition and resettlement"</li> </ul>	<ul style="list-style-type: none"> <li>•Refer to "Land acquisition and resettlement"</li> </ul>
<ul style="list-style-type: none"> <li>•Traffic congestion</li> <li>•Traffic accidents</li> </ul>	<ul style="list-style-type: none"> <li>•Draw up the Traffic Management Plan</li> </ul>	<ul style="list-style-type: none"> <li>•The monitoring plan shall be described in the plan.</li> </ul>	<ul style="list-style-type: none"> <li>•LGUs, Contractor</li> </ul>
<ul style="list-style-type: none"> <li>•Irrigation canals</li> </ul>	<ul style="list-style-type: none"> <li>•Avoid or minimize the blockage of the irrigation canals</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of construction sites.</li> <li>•Regular consultation meetings with LGUs and local people</li> </ul>	<ul style="list-style-type: none"> <li>•DOTC/PMO, LGUs, Contractor</li> </ul>
<ul style="list-style-type: none"> <li>•Conservation of Old PNR stations</li> </ul>	<ul style="list-style-type: none"> <li>•Draw up the Conservation Plan</li> </ul>	<ul style="list-style-type: none"> <li>•The monitoring plan shall be described in the plan.</li> </ul>	<ul style="list-style-type: none"> <li>•NHCP, PNR, LGUs</li> </ul>
<ul style="list-style-type: none"> <li>•Landscape resources</li> </ul>	<ul style="list-style-type: none"> <li>•Consult with LGUs and local people</li> </ul>	<ul style="list-style-type: none"> <li>•Regular consultation meetings with LGUs and local people</li> </ul>	<ul style="list-style-type: none"> <li>•DOTC/PMO, LGUs</li> </ul>
<ul style="list-style-type: none"> <li>•Shadows of elevated structures</li> </ul>	<ul style="list-style-type: none"> <li>•Consult with LGUs and local people</li> </ul>	<ul style="list-style-type: none"> <li>•Regular consultation meetings with LGUs and local people</li> </ul>	<ul style="list-style-type: none"> <li>•DOTC/PMO, LGUs</li> </ul>
<ul style="list-style-type: none"> <li>•Sanitary conditions during construction</li> </ul>	<ul style="list-style-type: none"> <li>•Draw up the plan for portable toilets and litter bins</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of construction sites.</li> <li>•Regular consultation meetings with LGUs and local people</li> </ul>	<ul style="list-style-type: none"> <li>•DOTC/PMO, LGUs, SC, Contractors</li> </ul>
<ul style="list-style-type: none"> <li>•Public health during construction</li> </ul>	<ul style="list-style-type: none"> <li>•Draw up the educational and training programs for contractors and workers.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of construction sites.</li> <li>•Regular consultation meetings with LGUs and local people</li> </ul>	<ul style="list-style-type: none"> <li>•DOTC/PMO, LGUs, SC, Contractors</li> </ul>
<b>Natural Environment</b>			
<ul style="list-style-type: none"> <li>•Land alteration</li> </ul>	<ul style="list-style-type: none"> <li>•Select the appropriate location for access roads and storage yards to minimize the land alteration area.</li> <li>•Restore the land alteration areas to the original state.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of construction sites.</li> </ul>	<ul style="list-style-type: none"> <li>•DOTC/PMO, LGUs, SC, Contractors</li> </ul>
<ul style="list-style-type: none"> <li>•Soil erosion in borrow pits and quarries</li> </ul>	<ul style="list-style-type: none"> <li>•Take measures to avoid soil erosion in borrow pits and quarries.</li> <li>•The site shall be restored to stable conditions.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of borrow pits and quarries</li> </ul>	<ul style="list-style-type: none"> <li>•DOTC/PMO, LGUs, SC, Contractors</li> </ul>



Potential Impacts	Mitigation Measures	Monitoring Program	Implementation Responsibility
•Impacts on groundwater veins and quality	•Select the appropriate construction methods to avoid/minimize any changes in groundwater flow and quality.	•Monitoring the groundwater levels at observation wells	DOTC/PMO, LGUs, DENR-EMB, SC, Contractors
•Increase of flood and inundation risk	•Select the appropriate structures to avoid/minimize the increase of flooding and inundation risks •Plan the construction schedule to work in the dry seasons	•Monitoring the water levels during heavy storms	DOTC/PMO, LGUs, SC, Contractors
•Temporary loss of swap habitat •Cutting trees and clearing vegetation	•Select the appropriate location for access roads and storage yards to minimize the land alteration area. •Restore the land alteration areas to the original state. •Replant trees.	•Regular monitoring of construction sites	DOTC/PMO, LGUs, DENR-EMB, SC, Contractors
•Temporary increase of CO <sub>2</sub> emission	•Utilize low-emission construction machines and vehicles. •Regular tune-ups and proper maintenance of construction equipment and machinery	•Regular monitoring of construction sites	DOTC/PMO, SC, Contractors
<b>Pollution Control</b>			
•Temporary increase of air pollutant emission	•Dust prevention measures: cover the sand/soil transporting trucks; water sprinkling; wet stockpiled sand/soil •Locate plants and storage yards away from residential and sensitive areas. •Utilize low-emission construction machines and vehicles. •Regular tune-ups and proper maintenance of construction equipment and machinery.	•Regular monitoring of construction sites •Monitoring of ambient air quality: -Parameters to be surveyed: TSP -Sampling site: Boundary with the residential area near the ongoing construction sites	DOTC/PMO, DENR-EMB, LGUs, SC, Contractors
•Deterioration of surface water quality	•Provision of portable toilets and garbage bins at the construction areas •Avoid improper soil mounds •Install a protector and drainage facilities to prevent soil erosion •Sediment tank installation •Provide proper construction machines and heavy vehicles and maintain them properly. •Oil and grease traps in the drainage system	•Regular monitoring of construction sites •Monitoring of water quality: -Parameters to be surveyed: Water Temperature, pH, DO, BOD, TSS, Oil/Grease, Total Coliforms -Sampling site: Surface water bodies at the ongoing construction sites	DOTC/PMO, DENR-EMB, LGUs, SC, Contractors
•Contamination of soil	•Remediation of brownfield sites if necessary. •Provide proper construction machines and heavy vehicles and maintain them properly. •Oil and grease traps in the drainage system	•Regular monitoring of construction sites •Monitoring of soil quality: - Parameters to be surveyed and sampling locations should be determined by the existing records of brownfields in the F/S.	DOTC/PMO, DENR-EMB, LGUs, SC, Contractors
•Disposal of waste soil/sand  •Disposal of solid waste	•Draw up the waste management plan •Disposal/treatment and reuse of the excavated waste soil, sand and sediment •Campaign on 3R for workers	•Regular monitoring in accordance with the Solid Waste Management Plan at the construction sites	DOTC/PMO, DENR-EMB, LGUs, SC, Contractors

Potential Impacts	Mitigation Measures	Monitoring Program	Implementation Responsibility
•Noise and vibration due to construction	<ul style="list-style-type: none"> <li>•Proper scheduling of high noise generating construction activities during daytime</li> <li>•Temporary noise barriers, particularly in noise-sensitive areas</li> <li>•Mufflers and noise suppressors and regular maintenance of heavy equipment and construction machinery</li> <li>•Provide construction schedule to residents in advance.</li> <li>•Limit construction works at night.</li> <li>•Use low-noise construction machines and heavy vehicles.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of construction sites</li> <li>•Monitoring of noise and vibration levels:                             <ul style="list-style-type: none"> <li>-Parameters to be surveyed: A-weighted sound pressure level [dB(A)] and Vibration Acceleration (m/s<sup>2</sup> and dB).</li> <li>-Sampling site: Boundary with the residential areas near the ongoing construction sites</li> </ul> </li> </ul>	DOTC/PMO, DENR-EMB, LGUs, SC, Contractors
•Ground subsidence	<ul style="list-style-type: none"> <li>•Select the appropriate construction methods to avoid/minimize any changes in groundwater flow and quality.</li> </ul>	<ul style="list-style-type: none"> <li>•Monitoring the groundwater levels in observation wells</li> </ul>	DOTC/PMO, DENR-EMB, LGUs, SC, Contractors
•Deterioration of sediment quality	<ul style="list-style-type: none"> <li>•Provide proper construction machines and heavy vehicles and maintain them properly.</li> <li>•Oil and grease traps in the drainage system</li> <li>•Quality of waste soil/sand and sediment from piling and excavations shall be examined to determine whether or not toxic substances are present.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of construction sites</li> <li>•Monitoring of sediment quality before commencement of construction: (Refer to the TOR in Table 10.2-4.)</li> </ul>	DOTC/PMO, DENR-EMB, LGUs, SC, Contractors

Source: JICA Study Team

Note: PMO: Project Management Office, NHCP: National Historical Commission of the Philippines, SC: Supervising Consultant

**Table 10.4-11 Proposed Mitigation Measures and Monitoring Plan for Operation Phase**

Potential Impacts	Mitigation Measures	Monitoring Program	Implementation Responsibility
<b>Social Environment</b>			
<ul style="list-style-type: none"> <li>•Restoration of income loss</li> <li>•Livelihood and living status</li> </ul>	<ul style="list-style-type: none"> <li>•The RAP shall be prepared for all types of affected people (including informal settlers) in accordance with the JICA Guidelines and WB safeguard policies.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of living and livelihood conditions of relocated families in the relocation sites in accordance with RAP.</li> </ul>	DOTC/PMO/PNR, Local Inter-Agency Committee (NHA, PCUP and other national agencies and LGUs),
<ul style="list-style-type: none"> <li>•Uncontrolled land use</li> </ul>	<ul style="list-style-type: none"> <li>•Consult with LGUs</li> </ul>	<ul style="list-style-type: none"> <li>•Responsibility of LGUs</li> </ul>	LGUs
<b>Natural Environment</b>			
<ul style="list-style-type: none"> <li>•Land alteration</li> </ul>	<ul style="list-style-type: none"> <li>•Restore the land alteration areas to the original state.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of restoration sites.</li> </ul>	DOTC/PMO, LGUs
<ul style="list-style-type: none"> <li>•Impacts on of groundwater vein and quality</li> </ul>	<ul style="list-style-type: none"> <li>•Consider mitigation measures if needed based on the monitoring results.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of the groundwater levels and quality in the observation wells</li> <li>-Parameters to be surveyed: Water Level, Water Temperature, Color, pH, Turbidity, TDS, Conductivity, Total hardness, Total Coliforms</li> <li>-Sampling site: Observation wells</li> </ul>	DOTC/PMO, LGUs, DENR-EMB
<ul style="list-style-type: none"> <li>•Increase of flood and inundation risk</li> </ul>	<ul style="list-style-type: none"> <li>•Consider mitigation measures if needed based on the monitoring results.</li> </ul>	<ul style="list-style-type: none"> <li>•Monitoring the water levels during heavy storms</li> </ul>	DOTC/PMO, LGUs, SC, Contractors
<ul style="list-style-type: none"> <li>•Cutting trees and clearing vegetation</li> </ul>	<ul style="list-style-type: none"> <li>•Restore the land alteration areas to the original state.</li> <li>•Replant trees</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of restoration sites and growth of replanted trees.</li> </ul>	DOTC/PMO, LGUs, DENR-EMB, SC, Contractors
<b>Pollution Control</b>			
<ul style="list-style-type: none"> <li>•Wastewater treatment</li> </ul>	<ul style="list-style-type: none"> <li>•Proper operation and maintenance of wastewater treatment facilities at stations and depots.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of water quality:</li> <li>-Parameters to be surveyed: Color, Water Temperature, pH, COD, TSS, TDS, Oil/Grease, Surfactants, Total Coliforms</li> <li>-Sampling site: Effluent from wastewater treatment facilities</li> </ul>	DOTC/PMO, DENR-EMB, LGUs
<ul style="list-style-type: none"> <li>•Disposal of solid waste</li> </ul>	<ul style="list-style-type: none"> <li>•Draw up the waste management plan</li> <li>•Campaign on 3R for users</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring in accordance with the Solid Waste Management Plan</li> </ul>	DOTC/PMO, DENR-EMB, LGUs
<ul style="list-style-type: none"> <li>•Noise and vibration due to construction</li> </ul>	<ul style="list-style-type: none"> <li>•Noise and vibration attenuation measures: installation of noise barriers especially along the residential areas and noise sensitive zones</li> <li>•Installation of shock absorber pads and ballast</li> <li>•Regular maintenance to keep railways in good condition</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of noise and vibration levels.</li> <li>-Parameters to be surveyed: A-weighted sound pressure level [dB(A)] and Vibration Acceleration (m/s<sup>2</sup> and dB).</li> <li>-Sampling site: Boundary with the residential areas along the railway track.</li> </ul>	DOTC/PMO, DENR-EMB, LGUs
<ul style="list-style-type: none"> <li>•Ground subsidence</li> </ul>	<ul style="list-style-type: none"> <li>•Consider mitigation measures if needed based on the monitoring results.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of fluctuation of groundwater levels in observation wells</li> </ul>	DOTC/PMO
<ul style="list-style-type: none"> <li>•Deterioration of sediment quality</li> </ul>	<ul style="list-style-type: none"> <li>•Proper operation and maintenance of wastewater treatment facilities at stations and depots.</li> </ul>	<ul style="list-style-type: none"> <li>•Regular monitoring of water quality. (Refer to water quality monitoring)</li> </ul>	DOTC/PMO, DENR-EMB, LGUs

Note: PMO: Project Management Office

Source: JICA Study Team

## 10.5 Stakeholder Consultation Meetings

### 10.5.1 Objective of Stakeholder Consultation

In accordance with the JICA Guidelines, it was scheduled to assist DOTC to hold the stakeholder consultation meetings. The objectives of the meetings are:

- To explain the basic concept of AER;
- To explain route alternative plans and station locations;
- To obtain comments/suggestions from the stakeholders on the project plan and also environmental and social considerations (draft scoping); and,
- To reflect the result of the consultations into the further study

### 10.5.2 Result of Stakeholder Consultation Meetings

A total of six meetings, that is, two meetings in each province (Pampanga, Bulacan, and Metro Manila) were held as shown in Table 10.4-1. The targeted stakeholders were mainly LGUs, provincial and city governments which could be regarded as the representatives of the project affected communities. Participants also included the national government agencies (NHA, Presidential Commission on Urban Poor (PCUP), Northrail, PNR) and private sectors (Manila North Tollways Corporation (MNTC), the chamber of commerce and industry).

**Table 10.5-1 Schedule and Attendees of Stakeholder Consultation Meetings**

No	Date	Venue	Attendants	Number of Attendants
1	January 31, 2013	CDC Building 2125, Clark Freeport Zone	LGUs (Pampanga Province, San Fernando City, Angeles City, Mabalacat City), National agencies (NHA, PCUP), DOTC (PNR, Northrail), Private sector (MNTC, Pampanga Chamber of Commerce and industry)	23
2	February 01, 2013	Local Governance Center, Provincial Capital of Bulacan	LGUs (Bulacan Province, Guiguinto City, Malolos City, Calumpit City), National agencies (NHA, PCUP), DOTC(PNR, Northrail)	22
3	February 04, 2013	Provincial Capitol Building of Pampanga	LGUs (Sto. Tomas City), National agencies (PCUP), DOTC (PNR, Northrail), Private sector (Pampanga Chamber of Commerce and industry)	11
4	February 07, 2013	Local Governance Center, Provincial Capital of Bulacan	LGUs (Bulacan Province, Apalit City, Balagtas City, Marilao City, Meycauayan City), DOTC (PNR, Northrail)	16
5	February 11, 2013	Finance Building, Valenzuela City Hall	MMDA, LGUs (Caloocan City, Valenzuela City), DOTC (PNR, Northrail)	14
6	February 13, 2013	Executive Lounge, Makati City Hall	MMDA, LGUs (Makati City), DPWH, DOTC (PNR, Northrail)	15

*Source: JICA Study Team*

After presenting the outline of the pre-F/S and the results of the initial impact assessment based on the scoping checklist, the open forum followed to obtain the comments and suggestions from the stakeholders.

Most of participants expressed favor for the Project in the light of convenient railway access to Metro Manila and regional economic growth. However, some attendees were concerned about the additional land acquisition and relocation of informal settlers. The major topics discussed in the Open Forum were summarized in Table 10.4-2.

The details of discussion in the stakeholder consultation meetings are shown in the highlights of the Open Forum in the attached Appendix D. The issues raised by the stakeholders should be fundamentally considered and reflected into the next F/S.

**Table 10.5-2 Summary of Comments/Suggestions and Actions/Countermeasures**

Area	Summary of Comments/Suggestions	Actions/Measures to be reflected into F/S
Pampanga	<ul style="list-style-type: none"> <li>• Are there any additional potential affected or displaced families aside from those in the previous project?</li> <li>• There is a possibility of an increase in the numbers of informal settlers to be relocated because of a long period of time prior to start of construction.</li> <li>• Shorten the implementation schedule for Phase I. It may affect the development of Northern Luzon.</li> <li>• Describe the specific required easements for building permits along railway track.</li> </ul> <p>Scoping checklist:</p> <ul style="list-style-type: none"> <li>• Impacts of tunnels (underground section) on shallow underground water tables in Pampanga</li> <li>• Land conversion due to the project implementation.</li> <li>• Waste management during construction</li> <li>• Noise abatement measures during construction</li> <li>• Preservation of the old PNR station, Sto. Tomas</li> </ul>	<ul style="list-style-type: none"> <li>• The RAP for all types of affected people due to additional land acquisition should be prepared in accordance with the World Bank safeguard policies based on the designed alignment in F/S.</li> <li>• Close coordination with DOTC, LGUs and relevant national agencies (NHA, PCUP) is needed.</li> <li>• Areas cleared of informal settlers have already been secured from future encroachment by Northrail in cooperation with LGUs.</li> <li>• Project implementation schedule will be further reviewed in the next F/S.</li> <li>• The required easement will be instructed by DOTC.</li> <li>• Detailed scoping will be conducted in the next F/S based on the baseline data, and consider the mitigation measures where needed.</li> </ul>
Bulacan	<ul style="list-style-type: none"> <li>• Road crossings along the track alignment should be kept open.</li> <li>• Is there a relocation site for additional affected or displaced families?</li> <li>• Will there be ground subsidence due to the over pumping of groundwater in Meycauayan and Marilao?</li> <li>• Soundness of the existing piers installed by the previous project should be determined</li> <li>• Are there any problems with the utilization of the PNR ROW by NLEX-SLEX Highway Connector (MNTC)?</li> <li>• What is the development plan for the intermodal station in the PNR owned land at Caloocan (MNTC)?</li> <li>• What is the radius requirement of trains with maximum speed of 160 kph? The speed should be reduced because of the narrow PNR ROW</li> <li>• Follow-up meetings with stakeholders are suggested</li> </ul> <p>Scoping checklist:</p> <ul style="list-style-type: none"> <li>• Remediation of brownfields</li> <li>• Impacts from the existing dumping site in Calumpit</li> <li>• Noise and vibration abatement measures</li> <li>• Widening plan for the rivers in Calumpit to be traversed by the alignment</li> <li>• Impacts on irrigation canals</li> <li>• Greater impacts on the community due to utility service interruption</li> </ul>	<ul style="list-style-type: none"> <li>• Closure is not expected since the track will be elevated all the way.</li> <li>• In close coordination and cooperation with DOTC, LGUs and relevant national agencies, further study shall be undertaken in F/S.</li> <li>• Data shall be collected in F/S.</li> <li>• Soundness and quality of the existing piers and structures should be checked in F/S and DD.</li> <li>• Inter-agency coordination with DOTC, DPWH and MNTC shall be needed.</li> <li>• Train speed will be further studied in F/S to fit the PNR ROW, especially inside Metro Manila.</li> <li>• Stakeholders meetings will be presented in every stage of the project for updates.</li> <li>• DOTC hotline numbers were provided for easy access to information.</li> <li>• Detailed scoping will be conducted based on the baseline data and information provided by LGUs in the next F/S, and it will consider the mitigation measures where needed.</li> </ul>

Area	Summary of Comments/Suggestions	Actions/Measures to be reflected into F/S
Metro Manila	<ul style="list-style-type: none"> <li>• Is there a possibility that the railway project be extended to the terminal being proposed in FTI?</li> <li>• Will PNR still continue its operation during operation of AER? Will there be an interface with PNR and other light railway transport systems?</li> <li>• Higher elevation of viaducts than the standards (enough vertical clearance) will be needed:               <ul style="list-style-type: none"> <li>- Vertical clearance for container trucks</li> <li>- Elevated road plans to prevent flooding</li> </ul> </li> <li>• Proper ventilation along the corridor</li> <li>• Road crossings along the track alignment should be kept open.</li> <li>• The reason why the underground section of the alignment is only from Buendia to EDSA</li> <li>• Air rights of the PNR ROW from Caloocan to Buendia are currently owned by the National Home Mortgage Finance Corporation. The NLEX-SLEX Connector Expressway will utilize the air space above the PNR ROW.</li> <li>• Enough capacity of the stormwater drainage system along the tracks should be provided in order to accommodate not only runoff from the tracks but also the outfall from the city area (Caloocan to Valenzuela).</li> <li>• Plan and budget for utility relocation.</li> <li>• There are some construction plans of the facilities such as:               <ul style="list-style-type: none"> <li>- An underground sewerage treatment plant near the Magallanes Station (MRT)</li> <li>- A gas pipeline near the railway</li> </ul> </li> <li>• Mixed operation of express and commuter trains</li> <li>• Location of the stations</li> <li>• Traffic Management Plan should be prepared in coordination with MMDA and LGUs.</li> <li>• All the issues and concerns raised during the stakeholder meeting should be included in the study</li> </ul>	<ul style="list-style-type: none"> <li>• The possibility of extension may be considered in F/S in the light of the DOTC strategy.</li> <li>• PNR will continue its operation even when the AER starts its operation. There will be an interface between the PNR and AER. Proper coordination with the affected transport system operators will be needed in next F/S.</li> <li>• The necessary vertical clearance will be considered based on the plans provided by LGUs and DPWH.</li> <li>• Closure is not expected since the track will be elevated all the way.</li> <li>• Primarily because there will be an expansion of the skyway along the route, a 200-meter bridge will be needed to construct. It is very difficult to span over the elevated skyway.</li> <li>• Air rights as well as underground rights will be considered in F/S.</li> <li>• The stormwater drainage system will be designed based on the collected baseline data and information provided by LGUs in the F/S.</li> <li>• Utility service to be relocated will be further surveyed in the F/S. The national government is responsible for the relocation of utilities.</li> <li>• Such facilities will be considered in design of the structures in the F/S.</li> <li>• To ensure smooth running of the express and commuter trains, a passing-through track will be installed.</li> </ul> <p>Location of the stations will be finalized by consulting with the stakeholders in the F/S.</p> <ul style="list-style-type: none"> <li>• Traffic Management Plan will be considered in coordination with MMDA and LGUs in F/S.</li> <li>• All the issues and concerns raised during the stakeholder meeting will be considered included in pre-F/S and next F/S.</li> </ul>

Source: JICA Study Team

*CHAPTER 11*

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**PROJECT EVALUATION**



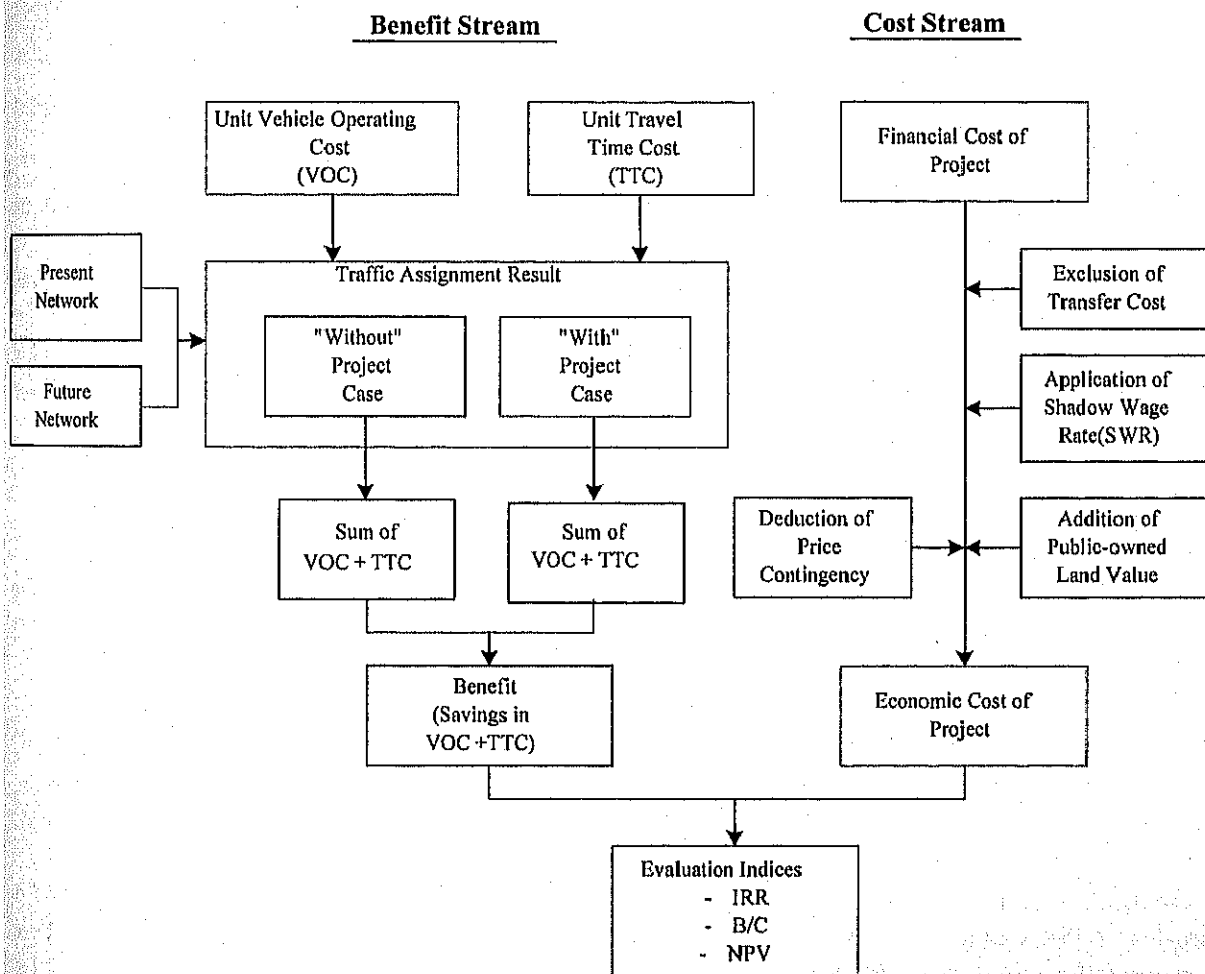
## CHAPTER 11 PROJECT EVALUATION

### 11.1 Economic Evaluation

The AER project was evaluated in this Chapter from the economic and financial viewpoints. Both evaluations were conducted by conducting a normative cost-benefit analysis in which the internal rate of return (IRR) was used as the main evaluation indicator. Evaluation period is 35 years after commencement of operation and the residual values in 35<sup>th</sup> year were taken into account in the cash flow analysis.

#### 11.1.1 Methodology

Economic benefit of the project is measured through a "with" and "without" comparison. Using the results of traffic assignment to a network with the project in question and also to the same network but without the project, total VOC and TTC of each case are estimated. And then, the benefit is obtained as the difference in those costs between the "with" and "without" cases.



Source: JICA Study Team

Figure 11.1-1 Work Flow for Economic Evaluation



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Economic benefit is defined as the amount saved in travel costs by the project in question. Travel costs consist of two components, vehicle operating cost (VOC) and travel time cost (TTC). These are the benefits that are the most direct and comparatively easy to quantify. There exist other benefits of a transportation project than those direct benefits, such as safety improvement and acceleration of urban development as well as mitigation of traffic congestion and consequently exhaust gas. In this pre-feasibility study, however, those kinds of benefits that are difficult to measure are ignored to exclude an arbitrary evaluation.

### 11.1.2 Economic Cost

Financial cost of the AER project stated in the previous Chapter was converted to the economic cost by taking the following steps.

#### (1) Reduction of Transfer Costs

Import duties and VAT included in the financial costs are not real consumption of goods and services but a transfer from investors to the National Treasury. Consequently they are deducted from the economic cost. In the same way, taxes included in the consulting services are to be deducted.

#### (2) Land Acquisition

In this project, land to accommodate the rail transit will be presumably donated to AER developers by Philippine Railway without any financial burden or investment in kind by the National Government. In the financial cost, the land cost is accounted only for the parts not belonging to PNR. If the land is used for AER, however, it will lose an opportunity to be utilized for other purposes. In this sense, the land cost has to be accounted in the economic cost. The land of PNR used for AER was evaluated at 7.63 billion Pesos. This amount is added to the financial land cost of 2.96 billion Pesos for purchasing land not owned by PNR.

#### (3) Shadow Wage Rate

The shadow wage rate represents the real value of the unskilled Labour force and is expressed in the formula below, which was proposed by Robert H. Haveman, American welfare economist.

$$\begin{aligned} \text{SWR} &= 1.0 && (\text{Unemployment rate} \leq 5\%) \\ &= 1.25 - (\text{unemployment rate}) / 0.2 && (5\% < \text{Unemployment rate} \leq 25\%) \\ &= 0.0 && (25\% < \text{Unemployment rate}) \end{aligned}$$

According to the annual statistics, the unemployment rate in the MM is as high as 10%. Then, SWR is estimated at 75% and the contribution by unskilled labourers has to be re-evaluated by deducting 25% of the wages to be paid to them. Unskilled labor cost is assumed at 30% of total personnel cost.

#### (4) Shadow Exchange Rate

At present, there is no exchange control in the Philippines, therefore, it is not necessary to apply the shadow exchange rate (SER).

**(5) Operating and Maintenance Cost**

Taxes are also included in the estimated operating and maintenance cost and have to be deducted. SWR was also applied to personnel cost in the O&M cost.

Taking the procedure stated above, annual investment amounts in terms of economic cost were obtained as shown in Table 11.1.1. The investment costs include other ancillary costs such as physical contingency, land cost and general administration. Total economic cost was estimated to be 296.9 billion Pesos, 87% of the financial cost while the economic O&M cost corresponds to 85% of the financial O&M cost.

**Table 11.1-1 Economic Cost of the AER Project**

**(2) Economic Cost**

(Million PHP at 2013 Price)

	Phase 1							
	Basic Cost			Tax		Engineering Cost	Physical Contingency	Total
	Foreign	Local	Total	Import Duty	VAT			
Civil	25728.2	38109.9	64320.5	0.0	0.0	6432.0	5306.4	76059.0
E&M	30236.1	3317.6	33595.6	0.0	0.0	3359.6	2771.6	39726.8
Rolling Stock	26914.8	1416.6	28331.4	0.0	0.0	0.0	2124.9	30456.3
Land	0.0	4445.3	4445.3	0.0	0.0	0.0	333.4	4778.7
<b>Total Cost</b>	<b>82879.1</b>	<b>47289.3</b>	<b>130892.8</b>	<b>0.0</b>	<b>0.0</b>	<b>9791.6</b>	<b>10536.3</b>	<b>151020.7</b>

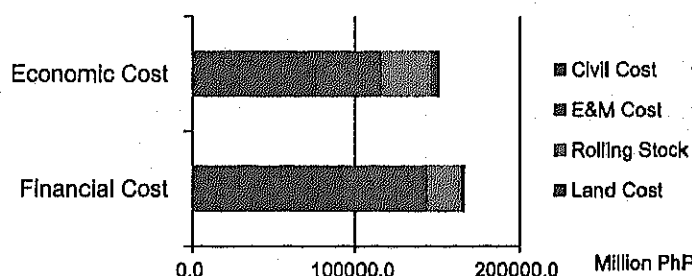
(Million PHP at 2013 Price)

	Phase 2							
	Basic Cost			Tax		Engineering Cost	Physical Contingency	Total
	Foreign	Local	Total	Import Duty	VAT			
Civil	26997.1	40495.7	67492.8	0.0	0.0	6749.3	5568.2	79810.2
E&M	33036.9	3670.8	36707.6	0.0	0.0	3670.8	3028.4	43406.8
Rolling Stock	14853.9	781.8	15635.6	0.0	0.0	0.0	1172.7	16808.3
Land	0.0	5416.2	5416.2	0.0	0.0	0.0	406.2	5822.4
<b>Total Cost</b>	<b>74887.9</b>	<b>50364.4</b>	<b>125252.2</b>	<b>0.0</b>	<b>0.0</b>	<b>10420.0</b>	<b>10175.4</b>	<b>145847.7</b>

(Million PHP at 2013 Price)

	Phase 1+ Phase 2							
	Basic Cost			Tax		Engineering Cost	Physical Contingency	Total
	Foreign	Local	Total	Import Duty	VAT			
Civil	52725.3	78605.6	131813.3	0.0	0.0	13181.3	10874.6	155869.2
E&M	63272.9	6988.3	70303.3	0.0	0.0	7030.3	5800.0	83133.6
Rolling Stock	41768.7	2198.4	43967.0	0.0	0.0	0.0	3297.5	47264.6
Land	0.0	9861.4	9861.4	0.0	0.0	0.0	739.6	10601.1
<b>Total Cost</b>	<b>157766.9</b>	<b>97653.7</b>	<b>255945.0</b>	<b>0.0</b>	<b>0.0</b>	<b>20211.7</b>	<b>20711.8</b>	<b>296868.4</b>

Source: JICA Study Team



Source: JICA Study Team

**Figure 11.1-2 Comparison of Financial and Economic Cost**

### 11.1.3 Economic Benefit

#### (1) Vehicle Operating Cost (VOC)

Vehicle operating cost is a function of driving speed. Unit costs by type of vehicle were updated and used in order to estimate savings in VOC by the AER project. Table 11.1.2 shows updated unit VOC which was originally composed of eight elements: (1) fuel cost, (2) oil cost, (3) tire cost, (4) repair cost, (5) depreciation cost, (6) capital opportunity cost (7) crew cost and (8) overhead cost.

Using those unit costs, total cost for assigned traffic to pass each link in the network were calculated and then by adding them, total VOC cost all over the network was estimated. This grand total means a daily transport cost spent in the Study Area. In general, a better network will generate a lower transport cost. Thus, the difference of the total transport costs of "without project" and "with project" network is the VOC savings attributable to the project.

**Table 11.1-2 Unit Vehicle Operating Cost in the Philippines, 2013**

(Unit: Pesos/1000 km)

	Speed (Km/hour)	Motor cycle	Car	HOV/Van	Jeepney	Standard Bus	Small Truck	Big Truck
Financial Cost	5	11,868	37,303	59,561	50,300	100,491	162,488	197,130
	10	6,918	22,622	33,840	30,010	58,068	88,321	110,870
	20	4,353	14,851	20,616	19,095	36,479	50,749	67,278
	30	3,476	12,129	15,284	15,651	29,529	37,314	48,920
	40	3,001	10,721	12,527	13,658	25,930	31,121	40,103
	50	2,785	9,944	11,247	13,647	25,399	27,899	36,175
	60	2,764	10,011	10,616	14,674	26,609	26,349	34,154
	70	2,824	10,337	10,436	16,275	28,685	25,536	33,826
	80	2,946	10,838	10,629	18,134	31,186	26,123	35,285
	90	3,144	11,583	11,238	19,719	33,441	27,391	37,844
Economic Cost	5	10,353	27,333	50,773	44,244	85,799	151,082	178,178
	10	6,038	16,746	28,298	25,742	49,323	81,375	99,240
	20	3,803	11,145	17,081	16,308	30,827	46,187	59,533
	30	3,038	9,188	12,595	13,361	24,941	33,756	43,107
	40	2,625	8,182	10,318	11,663	21,888	28,035	35,274
	50	2,437	7,658	9,223	11,658	21,473	24,994	31,702
	60	2,421	7,744	8,669	12,580	22,519	23,447	29,762
	70	2,473	8,024	8,474	13,973	24,316	22,571	29,308
	80	2,581	8,454	8,544	15,527	26,491	22,937	30,423
	90	2,756	9,083	8,987	16,854	28,449	23,928	32,533

Source: JICA Study Team

#### (2) Travel Time Cost (TTC)

Passenger's value of time was estimated based on the income data obtained through roadside interview surveys conducted in this study. The time value was assumed to grow in the future at the same rate as the GDP per capita growth. The resultant time value is shown in Table 11.1.3 by mode.

It should be noted that the time value is based on income and therefore, it is applicable only to trips for productive purpose, not to all trips. According to the roadside interview survey, trip purpose composition is as shown below:

- Business Trips: 8.0 % of total trips
- Home to Work Trips: 10.9% of total trips from home to work place and vice versa

The time value in the table is fully granted to business purpose trips and a half of the amount to "home to work" trips and "work to home" trips. Time during trips for "home to school", "shopping", "private" and "leisure" is regarded to have no value. Consequently, average time value during trips is calculated as below.

$$\text{Average time value at trip} = \text{Value in Table} \times (0.08 + 0.109 \times 0.5) = \text{Value in Table} \times 0.135$$

**Table 11.1-3 Present and Future Time Value of Passengers**

**(1) Passenger's Time Value**

Mode	(Peso/Hour)			
	LRT	Car	Jeepny	FX
2012	97.4	111.8	66.0	71.0
2020	123.3	141.6	83.5	89.9
2030	159.0	182.6	107.7	115.9
2040	203.1	233.2	137.6	148.1

**(2) Aggregated Time Value to Two Modes**

Mode	(Peso/Hour)	
	Car	Public
2012	111.8	78.1
2020	141.6	98.9
2030	182.6	127.5
2040	233.2	162.9

Source: JICA Study Team

**(3) Estimated Benefit**

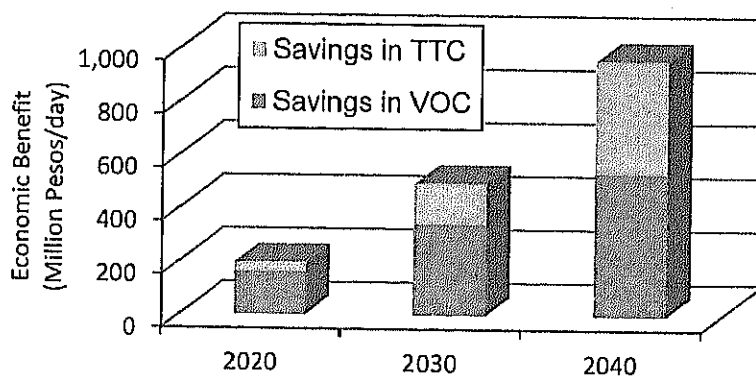
Economic benefit in the benchmark years of 2020, 2030 and 2040 was estimated as shown in Table 11.1.4 and Figure 11.1.3. In 2020, opening of Phase 1 will generate economic benefit of 420 million Pesos per day, of which VOC savings and TTC savings are about 40:60. In the future, TTC saving expands its share, as total benefit grows rapidly. This is reasonable because congestion of road traffic will become more serious and then time savings by using AER will become more significant while the time value becomes higher.

**Table 11.1-4 Daily Economic Benefit generated by AER**

(Million Pesos at 2013 price)

Year	Mode	"With Project" case			"Without Project" Case			Benefit (Without-With)		
		Total VOC	Total TTC	Total (VOC; TTC)	Total VOC	Total TTC	Total (VOC; TTC)	Total VOC	Total TTC	Total (VOC; TTC)
2020	Car	565	81,942	82,507	646	82,041	82,687	80.8	99.5	180.3
	Truck	775	7,070	7,845	827	7,079	7,906	51.8	9.2	61.0
	Bus	148	51,102	51,250	142	51,187	51,329	-6.5	85.6	79.1
	Jeepney	292	32,550	32,842	325	32,643	32,967	33.1	92.8	125.9
	LRT & PNR	0	355	355	0	392	392	0.0	37.5	37.5
	Manila- Clark AER	0	64	64	0	0	0	0.0	-63.6	-63.6
	<b>Total</b>	<b>1,780</b>	<b>173,081</b>	<b>174,861</b>	<b>1,939</b>	<b>173,342</b>	<b>175,281</b>	<b>159.2</b>	<b>261.0</b>	<b>420.3</b>
2030	Car	704	114,448	115,152	864	114,877	115,741	160.0	429.2	589.3
	Truck	969	9,687	10,656	1,076	9,730	10,806	106.5	43.2	149.7
	Bus	178	71,235	71,414	184	71,607	71,791	5.9	371.4	377.3
	Jeepney	373	47,274	47,647	440	47,660	48,100	67.0	385.4	452.4
	LRT & PNR	0	540	540	0	606	606	0.0	65.9	65.9
	Manila- Clark AER	0	147	147	0	0	0	0.0	-146.8	-146.8
	<b>Total</b>	<b>2,224</b>	<b>243,332</b>	<b>245,556</b>	<b>2,563</b>	<b>244,480</b>	<b>247,044</b>	<b>339.5</b>	<b>1148.3</b>	<b>1487.8</b>
2040	Car	840	159,355	160,195	1,101	160,424	161,524	260.4	1068.7	1329.1
	Truck	1,214	13,436	14,651	1,368	13,543	14,911	153.8	106.4	260.2
	Bus	211	98,403	98,614	232	99,483	99,715	20.2	1080.3	1100.5
	Jeepney	452	69,473	69,925	549	70,532	71,081	97.1	1058.5	1155.6
	LRT & PNR	0	774	774	0	866	866	0.0	92.0	92.0
	Manila- Clark AER	0	252	252	0	0	0	0.0	-251.8	-251.8
	<b>Total</b>	<b>2,718</b>	<b>341,693</b>	<b>344,411</b>	<b>3,250</b>	<b>344,847</b>	<b>348,097</b>	<b>531.5</b>	<b>3154.2</b>	<b>3685.7</b>

Source: JICA Study Team

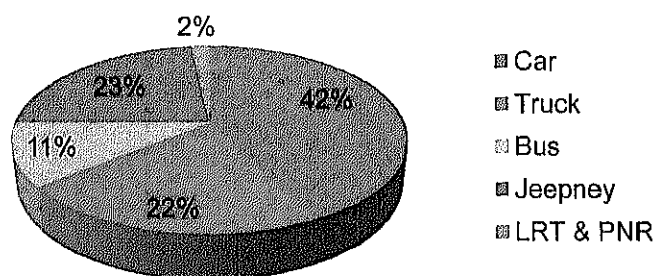


Source: JICA Study Team

**Figure 11.1-3 Growth of Daily Economic Benefit of AER Project**

#### (4) Beneficiaries

Who are the beneficiaries of the AER project? Distribution of economic benefit among vehicle type is estimated as shown in Figure 11.1.4. According to the results of a simulation, approximately 42% of the benefit is shared by car users, followed by truck drivers. Only about one third of the benefit will go to public transport users.



Source: JICA Study Team

**Figure 11.1-4 Distribution of Economic Benefit of VOC and TTC Reduction**

### (5) Evaluation Results

Based on the data stated above, the cash flow of the AER project was formulated and estimated project evaluation indicators such as Economic IRR, Net Present Value and B/C ratio using the economic discount rate of 15%, which was determined by NEDA as the capital opportunity in the Philippines.

Table 11.1.6 shows the cash flow of the economic benefit cost and benefit, based on which evaluation indicators were estimated as shown in Table 11.1.5.

The economic internal rate of return (E-IRR) is extraordinary at 28%, much higher than the threshold of 15%. The project is judged highly feasible from the economic point of view. Table 11.1.7 shows the sensitivity of the economic IRR to changes in cost and benefit. The E-IRR will be lower than 15% in the shaded area of the table. If the cost is correct, the E-IRR goes down below 15% only when the benefit is reduced by more than 60% and if the benefit is correctly estimated, the E-IRR is kept over 15% against a cost increase of 1.6 times. Thus, the economic viability of the project is judged very robust.

**Table 11.1-5 Economic Evaluation Indicators for the AER Project**

Indicator	Unit	Value
E-IRR	%	28.4%
NPV	Million Pesos	188422
B/C	-	2.58

Source: JICA Study Team

The sensitivity analysis revealed that the E-IRR is sensitive both to the cost and the benefit to the same extent. In other words, if the cost goes up by 10%, the benefit should be increased by 10% to keep the E-IRR at the same level and vice versa.

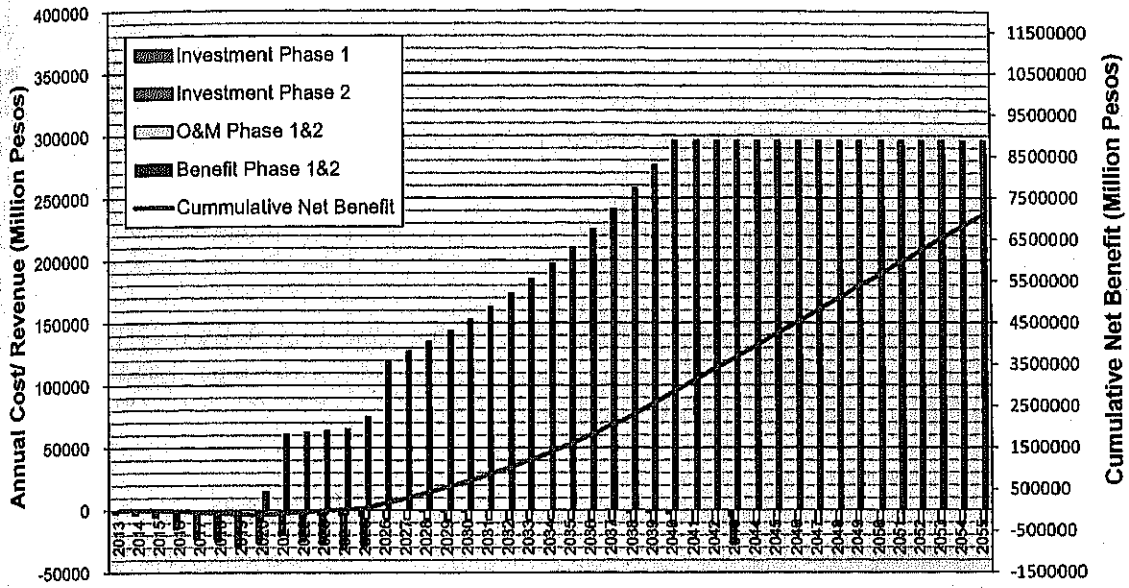
If phase 1 and phase 2 are evaluated individually, E-IRR of phase 1 is estimated 29.3% if phase 2 is never implemented. On the contrary, if only phase 2 is operated without phase 1, its E-IRR will be 18.6%. It seems reasonable that phase 2 implies lower E-IRR than Phase 1 without direct access to the midtown.

**Table 11.1-6 Cash Flow of Economic Cost and Benefit for Stage 1 + Stage 2 of AER**

(Million Pesos at 2013 price)

Year	Investment	O&M	Benefit	Cash Flow	Discounted Cash Flow (at 15%)		
					Cost	Revenue	Net CF
2013	2389			-2389	2389	0	-2389
2014	3427			-3427	2980	0	-2980
2015	5393			-5393	4078	0	-4078
2016	14659			-14659	9638	0	-9638
2017	22604			-22604	12924	0	-12924
2018	24736			-24736	12298	0	-12298
2019	28709			-28709	12412	0	-12412
2020	32656	672	15060	-18269	12529	5661	-6868
2021	18873	2745	61443	39825	7067	20086	13019
2022	24643	2802	62872	35227	7802	17815	10014
2023	30671	2861	63925	30393	8289	15801	7513
2024	35012	2922	65204	27270	8154	14015	5862
2025	33030	6785	75090	35274	7442	14035	6593
2026	0	6974	119920	112947	1133	19490	18357
2027	0	7168	127352	120183	1013	17998	16985
2028	1507	7369	135329	126453	1091	16631	15540
2029	1507	7577	143899	134816	971	15378	14407
2030	2009	7791	153114	143314	911	14228	13318
2031	0	7793	163030	155237	630	13174	12544
2032	0	7795	173708	165913	548	12206	11658
2033	0	7797	185217	177420	476	11317	10840
2034	0	7799	197630	189831	414	10500	10086
2035	0	7801	211029	203228	360	9750	9389
2036	0	8368	225503	217135	336	9059	8723
2037	0	8982	241152	232170	314	8424	8111
2038	4208	9648	258082	244226	421	7840	7419
2039	4208	10369	276413	261836	385	7302	6916
2040	5611	11151	296276	279514	385	6805	6420
2041	0	11153	296276	285123	223	5918	5695
2042	0	11155	296276	285121	194	5146	4952
2043	0	11157	296276	285119	168	4475	4306
2044	0	11159	296276	285117	147	3891	3744
2045	0	11161	296276	285115	127	3383	3256
2046	0	11163	296276	285113	111	2942	2831
2047	0	11165	296276	285111	96	2558	2462
2048	0	11167	296276	285109	84	2225	2141
2049	0	11169	296276	285107	73	1935	1862
2050	0	11171	296276	285105	63	1682	1619
2051	0	11173	296276	285103	55	1463	1408
2052	0	11175	296276	285101	48	1272	1224
2053	0	11177	296276	285099	42	1106	1064
2054	0	11179	296276	285097	36	962	926
2055	0	11181	296276	285095	32	836	805
Total	295853	310665	7695184	7088666	118888	307311	188422

Source: JICA Study Team



Source: JICA Study Team

**Figure 11.1-5 Cash Flow of Economic Cost and Revenue of AER**

**Table 11.1-7 Sensitivity Analysis of Economic Evaluation of AER**

Benefit	Cost	Change In Cost			
	Change	Base Case	20% up	40% up	60% up
Change In Benefit	Base Case	28.2%	25.2%	22.8%	20.9%
	20% down	24.6%	21.8%	19.7%	17.9%
	40% down	20.3%	17.9%	16.0%	14.5%
	60% down	15.2%	13.2%	11.6%	10.3%

Source: JICA Study Team



## 11.2 Financial Analysis

Financial analysis was made on the AER project by comparing cost and revenue. At this stage of pre-feasibility study, project IRR was estimated without accounting corporate income tax. This project IRR shows the overall profitability of the project, regardless of implementation scheme or organization.

### 11.2.1 Financial Cost

Financial cost of the AER project is shown in Table 11.2.1 in the same form as Table 11.1.1 for economic cost. The cost of phase 1 accounts for 51% and Phase 2 costs 49% of the total. Land cost is a crude estimation, not including compensation cost or replacement cost.

**Table 11.2-1 Financial Cost of AER**

	(Million Pesos at 2013 price)							
	Phase 1			Tax		Engineering Cost	Physical Contingency	Total
	Foreign	Local	Total	Import Duty	VAT			
Civil	25728.2	38592.3	64320.5	2444.2	7718.5	7203.9	6126.5	87813.5
E&M	30236.1	3359.6	33595.6	2872.4	4031.5	3762.7	3319.7	47581.9
Rolling Stock	26914.8	1416.6	28331.4	2556.9	3399.8	0.0	2571.6	36859.7
Land	0.0	586.9	586.9	0.0	70.4	0.0	49.3	706.6
<b>Total Cost</b>	<b>82879.1</b>	<b>43955.3</b>	<b>126834.4</b>	<b>7873.5</b>	<b>15220.1</b>	<b>10966.6</b>	<b>12067.1</b>	<b>172961.8</b>

	(Million PHP at 2013 Price)							
	Phase 2			Tax		Engineering Cost	Physical Contingency	Total
	Foreign	Local	Total	Import Duty	VAT			
Civil	26997.1	40495.7	67492.8	2564.7	8099.1	7559.2	6428.7	92144.5
E&M	33036.9	3670.8	36707.6	3138.5	4404.9	4111.3	3627.2	51989.5
Rolling Stock	14853.9	781.8	15635.6	1411.1	1876.3	0.0	1419.2	20342.3
Land	0.0	1875.1	1875.1	0.0	225.0	0.0	157.5	2257.8
<b>Total Cost</b>	<b>74887.9</b>	<b>46823.3</b>	<b>121711.1</b>	<b>7114.3</b>	<b>14605.3</b>	<b>11670.4</b>	<b>11632.6</b>	<b>168733.9</b>

	(Million PHP at 2013 Price)							
	Phase 1+ Phase 2			Tax		Engineering Cost	Physical Contingency	Total
	Foreign	Local	Total	Import Duty	VAT			
Civil	52725.3	79088.0	131813.3	5008.9	15817.6	14763.1	12555.2	179958.1
E&M	63272.9	7030.3	70303.3	6010.9	8436.4	7874.0	6946.8	89571.4
Rolling Stock	41768.7	2198.4	43967.0	3968.0	5276.0	0.0	3990.8	57202.0
Land	0.0	2462.0	2462.0	0.0	295.4	0.0	206.8	2964.2
<b>Total Cost</b>	<b>157766.9</b>	<b>90778.6</b>	<b>248545.6</b>	<b>14987.9</b>	<b>29825.5</b>	<b>22637.1</b>	<b>23699.7</b>	<b>339695.8</b>

Source: JICA Study Team

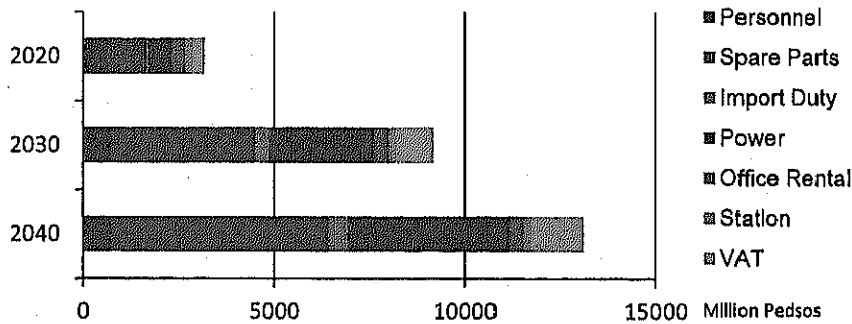
In the same way as the economic evaluation, annual operating and maintenance cost was estimated as shown in Table 11.2.2 and Figure 11.2.1, based on the train operation plan. The O&M cost will increase together with demand increase and the resulting increase in the number of trains. In the early stage, personnel cost has the second largest share. In the long run, however, spare parts cost and power cost will increase remarkably and these two costs will share more than two thirds in 2040.

**Table 11.2-2 Operating and Maintenance Cost of AER**

(Million Pesos at 2013 Price)

Item/Year	2020	2025	2030	2035	2040
Manpower	616.78	670.08	683.40	683.40	720.71
Administration, OCC, fixed	111.40	111.40	111.40	111.40	111.40
Stations	95.85	95.85	95.85	95.85	95.85
Civil, Tracks	292.65	292.65	292.65	292.65	292.65
Rolling Stock	21.32	74.62	87.94	87.94	125.25
Power	20.00	20.00	20.00	20.00	20.00
Janitors	75.56	75.56	75.56	75.56	75.56
Spare Parts	979.21	3,255.64	3,810.36	3,810.36	5,674.22
Capital	626.25	2,493.59	2,948.63	2,948.63	4,477.55
Consumables	352.96	762.04	861.73	861.73	1,196.67
Power	590.35	2,350.66	2,779.61	2,779.61	4,220.88
Office Rental & Maintenance	365.86	365.86	365.86	365.86	365.86
Station Services (security)	182.93	182.93	182.93	182.93	182.93
<b>Total</b>	<b>2,735.13</b>	<b>6,825.16</b>	<b>7,822.16</b>	<b>7,822.16</b>	<b>11,164.60</b>

Source: JICA Study Team



Source: JICA Study Team

**Figure 11.2-1 Operating and Maintenance Cost of AER**

## 11.2.2 Revenue

Fare revenue was estimated using the results of the traffic assignment under the fare system assumed for the demand forecast, that is, 20.00 Pesos as the minimum charge and additional 1.5 Pesos per km for commuter trains and 3.0 Pesos for express trains. Operation of each phase was assumed to start on the first of October. Here, one year is equivalent to 335 days as there are about 60 holidays including national holidays, when the demand would be a half of week days. Fare discount for students and disabled was not considered in this study.

After phase 2 starts operation in 2025, the number of passengers of AER will rapidly increase. It may be dangerous, however, to assume such a rapid growth to continue beyond 2040. The demand will almost reach the capacity of AER. For this reason, the demand and revenue were assumed to level off after 2040. Table 11.2.3 and Figure 11.2 2 show the fare revenue in each bench mark year. Revenue from express trains is 27% of the total in 2030 and the share will expand to 34% in 2040.

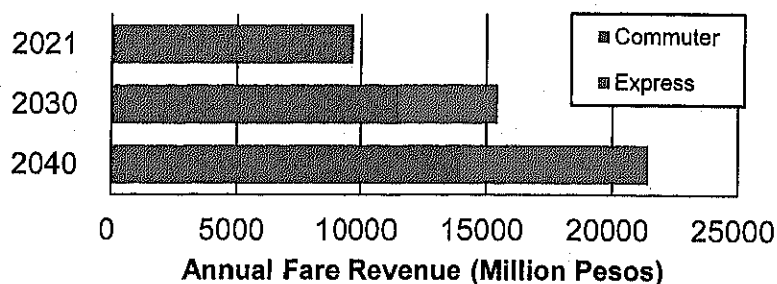
**Table 11.2-3 Annual Fare Revenue**

(Million Pesos at 2013 price)

Year	Commuter Train	Express Train	Total
2020	7,411	-	7,411
2030	11,442	4,004	15,446
2040	14,004	7,481	21,485

Note: The revenue in 2020 is adjusted to annual amount.

Source: JICA Study Team



Source: JICA Study Team

Figure 11.2-2 Growth of Revenue of AER

A railway transport service will necessarily generate non-fare revenue more or less such as a concession fee and rent of kiosks and shops inside or at a fringe of stations and commissions for advertisements in the station or inside a train. As for the commercial advertisement and revenue from space rent, 8.0% of annual fare revenue was counted, assuming 10.0% of fare revenue as gross revenue and 2.0 % as management cost.

### 11.2.3 Evaluation Results

By comparing the cost and the revenue stated above, the financial cash flow of the AER projects was composed as shown in Table 11.2.5 and Figure 11.2.3. As the land cost is not depreciable and life of infrastructure is longer than 35 years (60 years were assumed) the residual value in 2055 was refunded in the last year of the cash flow. The evaluation indicators were estimated based on the cash flow, as shown in Table 11.2.4. The interest rate of the Japanese ODA Loan is assumed at 0.2% p.a. while the capital opportunity in the Philippines is considered to be 15%. Then, NPV and B/C were calculated under both discount rates.

Table 11.2-4 Financial Evaluation Indicators for the AER Project

Indicator	Discount Rate	Unit	Value
F-IRR	-	%	1.1%
NPV	15%	Million Pesos	-96118
	0.2%	Million Pesos	63021
B/C	15%	-	0.28
	0.2%	-	1.11

Source: JICA Study Team

F-IRR is positive but at a low level of one percent. The project is not deemed as commercially feasible. However, the project can be viable if it is mostly funded by a soft loan such as the Japanese ODA Loan of which interest is only 0.2%. If the overall interest is in such a low level, the cash flow will possibly be sustainable with some amount of favorably conditioned short-term loans.

Table 11.2.6 shows the sensitivity of F-IRR against changes of revenue and cost. F-IRR will become negative by either of 20% cost increase or 20% revenue decrease. Thus, the financial viability of the project is fragile. The F-IRR is improved to 4.7% with 20% cost reduction and at the same time, with 20% revenue increase.

F-IRR of Phase 1 is estimated at 3.0% if Phase 2 is not implemented while F-IRR of Phase 2 alone will be

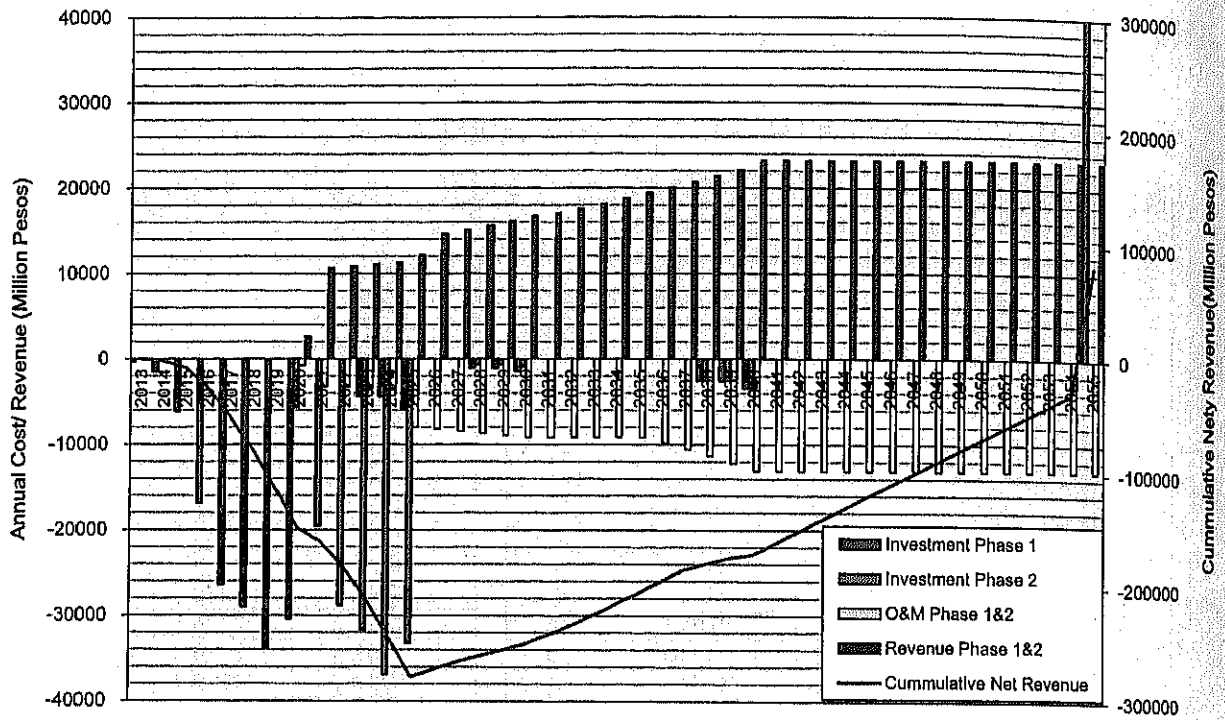
1.7%. Then, Phase 2 seems to hold back the financial viability of the project.

**Table 11.2-5 Cash Flow of Financial Cost and Revenue for Stage 1 + Stage 2 of AER**

(Million Pesos at 2013 price)

Year	Investment	O&M	Revenue	Cash Flow	Discounted Cash Flow (at 15%)		
					Cost	Revenue	Net CF
2013	353			-353	353	0	-353
2014	1515			-1515	1317	0	-1317
2015	6172			-6172	4667	0	-4667
2016	16943			-16943	11140	0	-11140
2017	26460			-26460	15128	0	-15128
2018	29040			-29040	14438	0	-14438
2019	33798			-33798	14612	0	-14612
2020	36158	792	2614	-34336	13891	983	-12908
2021	19558	3234	10666	-12125	7451	3487	-3964
2022	28827	3302	10879	-21250	9133	3093	-6040
2023	36122	3373	11097	-28397	9762	2743	-7019
2024	41321	3445	11319	-33447	9622	2433	-7189
2025	39145	7991	12195	-34941	8810	2279	-6531
2026	0	8211	14619	6408	1335	2376	1042
2027	0	8438	15110	6671	1193	2135	943
2028	1824	8673	15617	5119	1290	1919	629
2029	1824	8916	16141	5401	1148	1725	577
2030	2432	9166	16682	5084	1078	1550	472
2031	0	9166	17016	7849	741	1375	634
2032	0	9166	17587	8420	644	1236	592
2033	0	9166	18177	9010	560	1111	551
2034	0	9166	18786	9620	487	998	511
2035	0	9166	19417	10250	423	897	474
2036	0	9833	20068	10235	395	806	411
2037	0	10556	20741	10186	369	725	356
2038	5093	11339	21437	5005	499	651	152
2039	5093	12188	22156	4875	456	585	129
2040	6791	13108	23204	3305	457	533	76
2041	0	13108	23204	10096	262	463	202
2042	0	13108	23204	10096	228	403	175
2043	0	13108	23204	10096	198	350	152
2044	0	13108	23204	10096	172	305	133
2045	0	13108	23204	10096	150	265	115
2046	0	13108	23204	10096	130	230	100
2047	0	13108	23204	10096	113	200	87
2048	0	13108	23204	10096	98	174	76
2049	0	13108	23204	10096	86	152	66
2050	0	13108	23204	10096	74	132	57
2051	0	13108	23204	10096	65	115	50
2052	0	13108	23204	10096	56	100	43
2053	0	13108	23204	10096	49	87	38
2054	0	13108	23204	10096	43	75	33
2055	-101323.6	13108	23204	111419	-249	66	315
Total	237143.4	365017	683585	81425	132874	36756	-96118

Source: JICA Study Team



Source: JICA Study Team

Figure 11.2-3 Cash Flow of Financial Cost and Revenue of AER

Table 11.2-6 Sensitivity Analysis of Financial Evaluation of AER

Revenue	Cost Change	Change in Cost			
		40% down	20% down	Base Case	20% up
Change in Revenue	40% up	9.4%	6.2%	4.1%	2.4%
	20% up	7.6%	4.7%	2.6%	1.1%
	Base Case	5.7%	3.0%	1.1%	-0.5%
	20% down	3.6%	1.1%	-0.8%	-2.2%

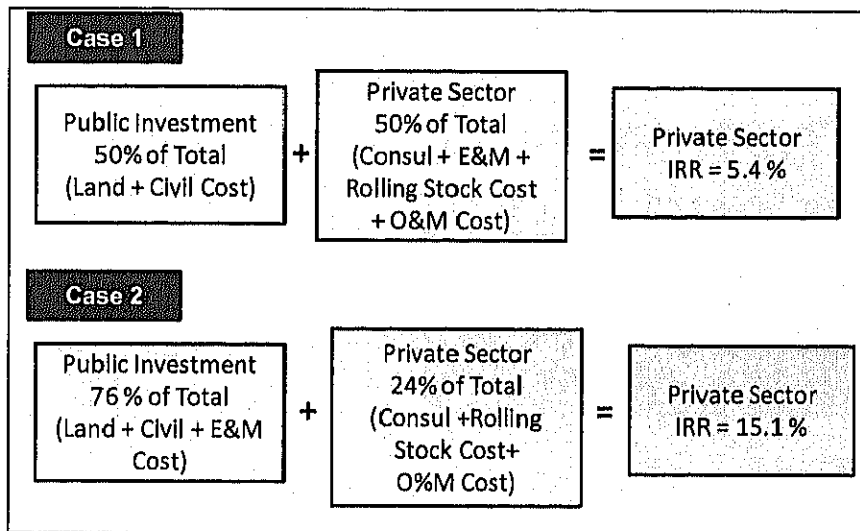
Source: JICA Study Team

### 11.3 Possibility of Applying PPP Scheme

As shown in the previous section, F-IRR of the project is barely positive which means that a PPP scheme would be difficult to apply to the AER project because the private capital will demand a much higher rate of return than could be produced by a public transport project.

According to the estimated cost, the sum of land cost and infrastructure cost accounts for about 50%. A trial calculation was made for a PPP scheme where the public sector shoulders land and infrastructure and the private sector undertakes the rest: such costs as consultant, E&M, rolling stock, and O&M. And the private sector takes all the revenue for a concession period. In this case, F-IRR of the private sector is about 5.4%, not high enough for private capital (Figure 11.3.1).

If the public sector shoulders E&M cost in addition to land and infrastructure, the share of the public sector will be 76% and the private sector shoulders the costs of the consultant, rolling stock, and O&M, which account for 24% of the total cost. In this case, the F-IRR of the private sector will be improved to 15.1% which can attract private sector funds. However, the PPP law in the Philippines prohibits the Government sector to take a share over 50%.



Source: JICA Study Team

**Figure 11.3-1 Trial Calculation of Private Sector's IRR under assumed PPP Scheme**


By the simple calculation stated above, it may be concluded that the AER project is not profitable enough to invite the private sector. As the F-IRR is at least positive, the project can be financially sustainable if the Government implements it as a public investment project with an ODA soft loan. After completion of infrastructure and superstructure, the Government can commission a private entity to maintain and operate the railway.

In order to improve the profitability of the project, more effort should be expended to increase non-fare revenues, for example, by utilizing high potential for urban or commercial development around the stations, as well as to reduce the cost and increase fare revenue.

*CHAPTER 12*

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**CONSIDERATION POINTS AND  
PROPOSALS FOR REALIZATION  
OF THE PROJECT**



## CHAPTER 12 CONSIDERATION POINTS FOR REALIZATION OF THE PROJECT

### 12.1 Consideration Points for Realization of the Project

Consideration points for realization of the AER project are summarized below;

- (1) Selected route inside of Manila conflicts with Segment 10 and Connector road projects of DPWH. Design of Segment 10 and Connector road projects show that their alignment occupies the PNR right-of-way. In this Pre-F/S of AER, JST suggested to have a coordination meeting with DOTC, but the coordination meeting could not be convened. However, this coordination meeting should be conducted before starting of F/S.
- (2) AER construction implementation schedule and cost are reflected by PNR operation. And the future PNR network plan also will reflect the AER project. Basic future role/policy of PNR shall be considered before the starting of the AER F/S.
- (3) Railway system is an integrated system composed of not only Hardware such as infrastructure, rolling stock, signaling & communication, power supply, but also Software, including Operation, Maintenance, Human resources, etc. These sub-systems influence each other and cannot be decided separately from other systems.  
It is the most important and the first step to decide the main characteristics of the line, such as whether Interoperability into/from existing line is necessary or not, which is the priority between commuter transport and airport access transport.
- (4) Topographic/Geological data of AER route between Caloocan Sta. and FTI Sta. shall be collected officially by DOTC from DPWH, before the start of F/S in order to save F/S time.
- (5) Topographic/Geological data of AER route between Malolos Sta. and Callocan Sta. of Northrail shall be collected officially by DOTC before the start of F/S in order to conduct F/S speedily
- (6) It is necessary to pay due attention to the arbitration between NLRC and the Chinese contactor of the Northrail project.
- (7) Make a considered judgment on the re-use of existing constructed structures of Northrail project, but this shall take into consideration the on-going arbitration between NLRC and the Chinese Contractor
- (8) The Resettlement Action Plan for all types of affected people and assets due to additional land acquisition shall be drawn up in accordance with the internationally accepted guidelines such as the World Bank safeguard policies. The RAP shall also include the relocation plan for informal settlers.
- (9) Acquisition of alternative ROW in BCDA property shall be considered in order to avoid the formidable relocation of informal settlers remaining in the PNR ROW along the CIA at Mabalacat.
- (10) Measures to avoid a large scale relocation of informal settlers remaining in the PNR ROW shall be considered in the route plan/ construction plan of AER inside Metro Manila.
- (11) Implementation agency structure for AER project shall be decided by DOTC.
- (12) NEDA application shall be submitted by DOTC.
- (13) Transit Oriented Development (TOD) plan for the selected areas surrounding the stations shall be prepared in during the AER F/S.
- (14) Future populations and job opportunities of the TOD areas shall be estimated in the F/S, and shall be reflected in the passenger demand estimates accordingly.
- (15) The station plaza and access road development plan for the stations shall be prepared in the F/S.



## 12.2 Proposed Terms of Reference for Feasibility Study

JST recommended that the Terms of Reference for the Feasibility Study should take into consideration the results of this Pre-F/S study.

Terms of Reference for the Feasibility study are outlined below;

(1) Project Scope

Total Route Length = 53 km between FTI station and Malolos station

(2) Itemized Terms of Reference of the Feasibility Study

**Table 12.2-1 Terms of Reference**

Description	Pre- Feasibility Study	Feasibility Study
(1) Collect, Organize and Analyze Reference Materials and Information	✓	✓ Collect new information
(2) Identify the Current Issues and Confirm Necessity of this Project		
2-1. Current socio-economic conditions and development plans of the manila area	✓	✓ Collect new information
2-2. Review of existing projects in the railway sector in Philippines	✓	✓ Review Pre-F/S
2-3. Necessity of the Project based on current conditions	✓	✓ Review Pre-F/S
2-4. Coordination with DPWH regarding Connector Road and Segment10	✓ On going	✓
2-5. Coordination with PNR regarding PNR operation during and after construction	✓ On going	✓
(3) Review prepared Railway Network Planning for AER and PNR including operation, alignment, rail gauge, location of depot, multiple operation etc.	—	✓
(4) Prepare station plaza and access road development plan for the stations	—	✓
(5) Prepare Transit Oriented Development Plan for the selected areas surrounding the stations. Estimate future populations and job opportunities of the TOD areas and estimate passenger demand accordingly	—	✓
(6) Demand Forecast	✓ Take into consideration existing transportation network and future railway development (LRT1,2 extension and LRT7)	✓ Take into consideration future transportation network inclusive road projects

Source: JICA Study Team

**Table 12.2-1 Terms of Reference(2)**

Description	Pre- Feasibility Study	Feasibility Study
(7) Execute the Following the Surveys and Investigations		
7-1. Reconnaissance field survey	✓	✓
7-2. Traffic Survey	✓	✓ Additional survey
7-3. Topographical survey	✓ Collected Northrail Project data. Collecting DPWH data (Not Yet)	✓ Additional survey
7-4. Geological survey	✓ Collected Northrail Project data. Collecting DPWH data (Not Yet)	✓ Additional survey
7-5. Hydrological survey	—	✓
7-6. PNR railway system, and facilities investigation	—	✓
7-7. Utility survey	—	✓
7-8. Local materials and source survey	—	✓
7-9. Right-of-way confirmation survey	✓ Get ROW drawings	✓ Check ROW at site
7-10. EIA survey	✓ IEE level = existing reference review	✓ Field surveys for detailed EIA preparation
7-10. RAP survey	✓ Review only	Socio-economic surveys for RAP preparation
(8) Hydrological Study		
8-1. Review of any previous studies, data and hydraulic- hydrological reports	—	✓
8-2. Inundation and flood risk analysis	—	✓
8-3. Proposal for flood management measures	—	✓

Source: JICA Study Team

Table 12.2-1 Terms of Reference(3)

Description	Pre- Feasibility Study	Feasibility Study
(9) Confirmation of the Project Scope		
9-1. Phasing of the Project	✓	✓
9-2. Examination of main characteristics for AER	—	✓
9-3. Railway Alignment including vertical and horizontal	✓ For route selection Plan/Profile s=1/30,000	✓ Plan/Profile s=1/4,000(A3) :same as Northrail project drawings
9-4. Train operation plan for commuter and express trains including future (Phase2)	✓	✓
9-5. Station locations including entrances and Platform	✓ Recommended only station location	✓
9-6. Rolling stocks for commuter and express trains	✓ Introduced/ recommended JPN Train	✓
9-7. Railway system and safety equipment	✓ Ditto	✓
9-8. Civil structures including elevated and underground structure/construction gauge	✓ Recommended structure Type	✓
9-9 Station facilities	—	✓
(10) Proposal for Railway Management		
10-1. Proposal for management plan (including financial control)	✓ Recommended	✓
10-2. Consideration of personnel planning and organization structure	—	✓
(11) Formulation of the Project Implementation Plan		
11-1. Procurement of materials and equipment	✓	✓
11-2. Implementation schedule	✓	✓
11-3. Project cost estimation	✓	✓

Source: JICA Study Team

Table 12.2-1 Terms of Reference (4)

Description	Pre- Feasibility Study	Feasibility Study
(12) Confirmation of Project Implementation Structure		
12-1. Project implementation structure	—	✓
12-2. Operation and management structure	—	✓
12-3. Proposal for technical assistance	—	✓
(13) Environmental and Social Considerations		
13-1. Review of any previous studies	✓	✓ Collect additional information
13-2. Review of legal and institutional framework for social and environmental considerations in the Philippines	✓	✓ Review
13-3. Environmental impact assessment and environmental management plan	✓ SEA and IEE	✓ EIA for ECC application
13-4. Social impact assessment and preparation of Resettlement Action Plan (RAP)	Review only	✓
(14) Calculation of Project Effectiveness		
14-1. Calculation of performance indicators (operation and effect indicators)	—	✓ Focus on Cash Flow Analysis assuming JICA Loan
14-2. Identification of qualitative effectiveness	—	
14-3. Calculation of economic internal rate of return (EIRR)	✓	
14-4. Calculation of financial internal rate of return (FIRR)	✓	
(14) Proposal for Project Implementation and the Potential for Further Development	—	✓
(15) Training	—	✓

Source: JICA Study Team

# APPENDICES

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## APPENDIX A

*A-1: Traffic and Transport Surveys*

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## APPENDIX A

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# 1 TRAFFIC SURVEYS

## 1.1 Survey Items

The following surveys were conducted for MacArthur Highway, North Luzon Expressway (NLEX) and Clark International Airport.

- Vehicular traffic count;
- Vehicle occupancy;
- Roadside interview

## 1.2 Survey Method

### 1.2.1 Vehicular Traffic Count

Vehicular traffic count was made to get the traffic volume by hour, vehicle type, and direction. The survey duration was 18 hours for some stations and 24 hours for other stations. The survey form used is shown in **Appendix A**.

### 1.2.2 Vehicle Occupancy

For the vehicle occupancy survey, traffic counters recorded the number of passengers chosen at random by hour, vehicle type, and direction. The survey duration was also 18 hours or 24 hours. For NLEX, this survey was conducted only at entrance sides. The survey form used is shown in **Appendix A**.

### 1.2.3 Roadside Interview

Three types of roadside interview were conducted. One was interview with private mode passengers including taxi passengers. The second one was interview with public mode passengers and the third one was interview with public mode drivers.

For private mode passengers data on, trip origin and destination, trip purpose, occupancy, home address of interviewee were gathered. For public mode passengers data on, trip origin and destination, trip purpose, home address of interviewee were gathered, as well as, besides total fare paid from origin to destination. For public drivers data on, number of passengers and seating capacity, route of origin and destination were gathered. The survey duration was also for 18 hours or 24 hours. For NLEX, the survey was also conducted at entrance side only. The survey form used is shown in **Appendix A**.

## 1.3 Vehicle Classification

The surveyed vehicles are classified into 5 types as shown **Figure 1.3-1**. Vehicle type was not subjected to occupancy survey and roadside interview. The survey form used is shown in **Appendix A**.

Vehicle Type 1: Sedan, SUV, Pick-up, Taxi, Airport Taxi



Vehicle Type 2: Private or Public Van (seats 8+)



Vehicle Type 3: AUV-Public FX/Jeepney



Vehicle Type 4: All Buses



Vehicle Type 5: Others.



Figure 1.3-1 Vehicle Classification



### 1.4 Survey Location

Survey locations are shown in Figure 1.4-1. There are two (2) survey sites for MacArthur Highway and eighteen (18) survey sites for NLEX and one (1) survey site for Clark airport.

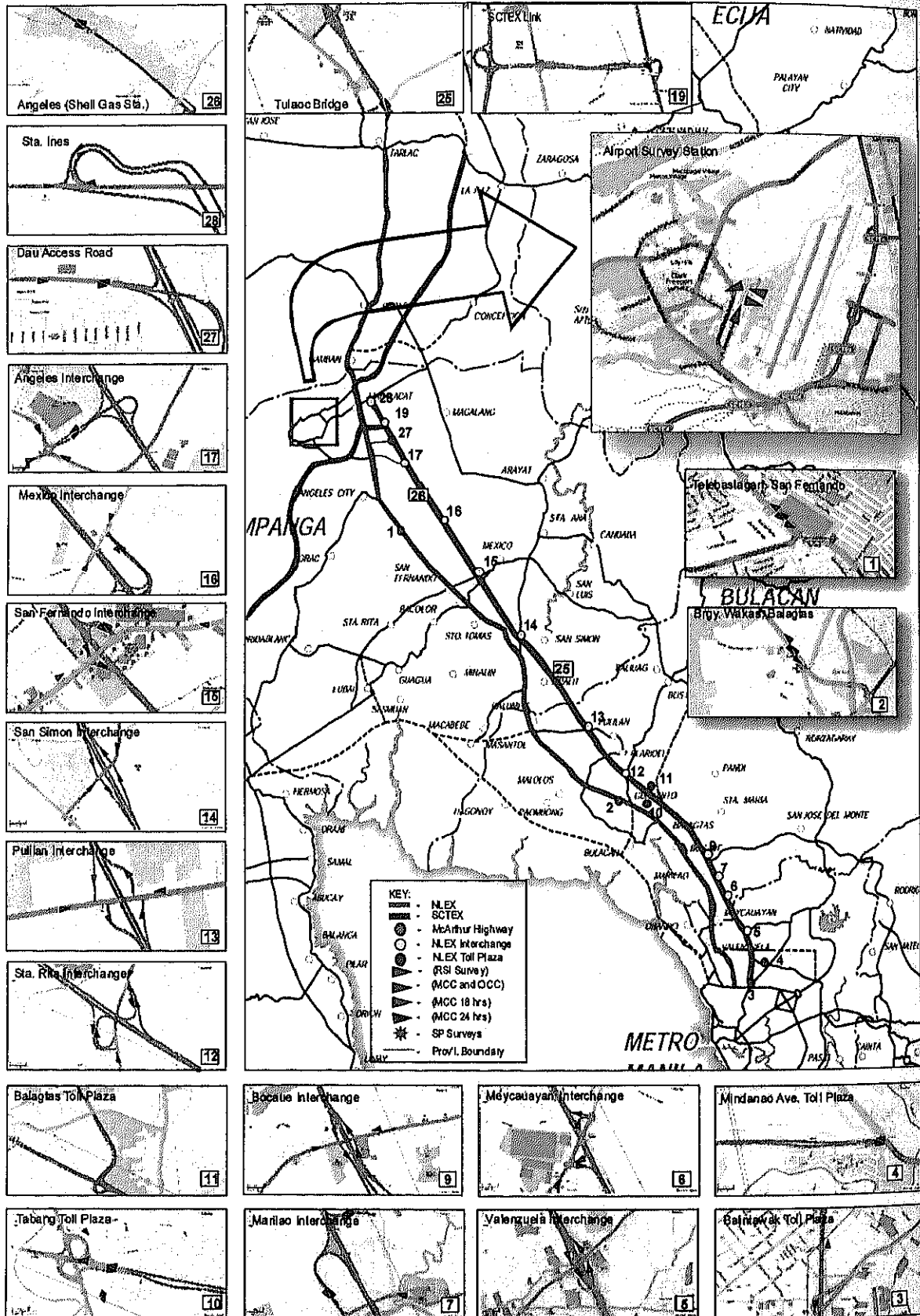


Figure 1.4-1 Survey Locations

1.5 Survey Duration and Survey Day and Date

Survey duration and survey date are shown in Table 1.5-1. For most of the survey sites, the duration was 18-hours, from 5am to 11pm. At the bridges in Angeles and Clark Airport survey duration was 24 hours from 5am to 5am of the next day. The survey was conducted from October 12 to 30.

Table 1.5-1 Survey Duration by Each Survey Site

Road Name	Station Code	Station Name	Entrance /Exit	Direction	Survey Duration			Survey Day	Date
					MCC	VOC	RSI		
MacArthur Highway	1	Telabastagan, San Fernando Pamp.	-	Southbound	18	18	18	Friday	10/12/12
				Northbound	18	18	18	Friday	10/12/12
	2	Bgy. Wakas Bocaue, Bulacan	-	Southbound	18	18	18	Wednesday	10/17/12
				Northbound	18	18	18	Wednesday	10/17/12
NLEX	3	Balintawak Toll	-	Southbound	18	18	-	Thursday	10/25/12
				Northbound	18	18	-	Thursday	10/25/12
	4	Mindanao Ave. Toll	Entrance	-	18	18	-	Thursday	10/25/12
			Exit	-	18	18	-	Thursday	10/25/12
	5	Valenzuela IC	Entrance	Southbound	18	18	18	Thursday	10/25/12
				Northbound	18	18	18	Thursday	10/25/12
			Exit	Southbound	18	18	18	Thursday	10/25/12
				Northbound	18	18	18	Thursday	10/25/12
	6	Meycauayan IC	Entrance	Southbound	18	18	18	Monday	10/29/12
				Northbound	18	18	18	Monday	10/29/12
			Exit	Southbound	18	18	18	Monday	10/29/12
				Northbound	18	18	18	Monday	10/29/12
	7	Marilao IC	Entrance	Southbound	18	18	18	Monday	10/29/12
				Northbound	18	18	18	Monday	10/29/12
			Exit	Southbound	18	18	18	Monday	10/29/12
				Northbound	18	18	18	Monday	10/29/12
	9	Bocaue IC	Entrance	Southbound	18	18	18	Monday	10/29/12
				Northbound	18	18	18	Monday	10/29/12
			Exit	Southbound	18	18	18	Monday	10/22/12
				Northbound	18	18	18	Monday	10/22/12
	10	Tabang Toll	-	Entrance	18	18	18	Friday	10/19/12
				Exit	18	18	18	Friday	10/19/12
	11	Balagtas Toll	-	Entrance	18	18	18	Monday	10/22/12
				Exit	18	18	18	Monday	10/22/12
	12	Sta. Rita IC	Entrance	Southbound	18	18	18	Monday	10/22/12
				Northbound	18	18	18	Monday	10/22/12
			Exit	Southbound	18	18	18	Monday	10/22/12
				Northbound	18	18	18	Monday	10/22/12
	13	Pulilan IC	Entrance	Southbound	18	18	18	Friday	10/19/12
				Northbound	18	18	18	Friday	10/19/12
			Exit	Southbound	18	18	18	Friday	10/19/12
				Northbound	18	18	18	Friday	10/19/12
	14	San Simon IC	Entrance	Southbound	18	18	18	Monday	10/22/12
				Northbound	18	18	18	Monday	10/22/12
			Exit	Southbound	18	18	18	Monday	10/22/12
				Northbound	18	18	18	Monday	10/22/12
	15	San Fernando IC	Entrance	Southbound	18	18	18	Monday	10/29/12
				Northbound	18	18	18	Monday	10/29/12
			Exit	Southbound	18	18	18	Monday	10/29/12
				Northbound	18	18	18	Monday	10/29/12
	16	Mexico IC	-	Entrance	18	18	18	Tuesday	10/30/12
				Exit	18	18	18	Tuesday	10/30/12
	17	Angeles IC	-	Entrance	18	18	18	Tuesday	10/30/12
				Exit	18	18	18	Tuesday	10/30/12
	25	Bridge at Apalit	-	Southbound	18	18	18	Monday	10/29/12
	26	Bridge at Angeles	-	Northbound	24	24	18	Tuesday	10/30/12
	27	Dau Access Road	-	Entrance	18	18	18	Tuesday	10/30/12
				Exit	18	18	18	Tuesday	10/30/12
	28	Sta. Ines Access Road	Entrance	Southbound	18	18	18	Tuesday	10/30/12
				Northbound	18	18	18	Tuesday	10/30/12
			Exit	Southbound	18	18	18	Tuesday	10/30/12
				Northbound	18	18	18	Tuesday	10/30/12
Clark airport	24	Clark airport entrance	-	Entrance	18	18	18		
				Exit	18	18	18		

1.6 Incident During Survey

In the roadside interview survey (RIS) for several periods during the day, no vehicle samples could be interviewed due to reasons in the table below. No incidents occurred which affected the traffic counts surveys, except for Station 5 at NLEX, Valenzuela Interchange (as shown below).

Table 1.6-1: Incidents' Report

Station Code	Station Description	Direction	Time	Reasons
1	MacArthur Highway, Telabastagan, San Fernando, Pampanga	Southbound and Northbound	0500 - 0600	Traffic enforcers not yet in the vicinity
		Northbound	1200 - 1400	Traffic enforcers took lunch
		Southbound and Northbound	2100 - 2300	Vehicle drivers refused to be interviewed
2	MacArthur Highway, Bgy. Wakas, Bocaue, Bulacan	Southbound and Northbound	0500 - 0600	Traffic enforcers not yet on site
5	NLEX, Valenzuela Interchange (Inbound to NLEX)	Southbound	2200 - 2300	Heavy rain
		Northbound	0500 - 0600	No enforcers yet
		Northbound	1900 - 2100	Heavy rain
			2200 - 2300	Heavy rain
6	NLEX, Meycauayan Interchange (Inbound to NLEX)	Southbound and Northbound	2200 - 2300	Motorists refused to be interviewed
7	NLEX, Marilao Interchange (Inbound to NLEX)	Northbound	0500 - 0700	No enforcers on site
		Southbound	2100 - 2300	Motorists refused to be interviewed
9	NLEX, Bocaue Interchange (Inbound to NLEX)	Southbound and Northbound	0500 - 0600	Traffic enforcers not yet in the area
		Northbound	0600 - 0700	Traffic enforcers not yet in the area
11	NLEX, Balagtas Toll (Between MacArthur and Tabang Toll)	Southbound and Northbound	0500 - 0600	No Traffic enforcers yet in the area
		Southbound and Northbound	2200 - 2300	Motorists refused to be interviewed

Cont...Table 1.6-1

Station Code	Station Description	Direction	Time	Reasons
12	NLEX, Sta. Rita Interchange (Inbound to NLEX)	Southbound and Northbound	0500 - 0600	Traffic enforcers not yet in the area
		Southbound And Northbound	2200 - 23600	Motorists refused to be interviewed
		Northbound	2100 - 2200	Motorists refused to be interviewed
13	NLEX, Pulilan Interchange (Pulilan to NLEX)	Southbound and Northbound	0500 - 0600	Traffic enforcers not yet in the area
		Southbound and Northbound	2200 - 2300	Motorists refused to be interviewed
14	NLEX, San Simon Interchange (Inbound to NLEX)	Southbound	0500 - 0600	Traffic enforcers not yet in the area
		Southbound and Northbound	2100 - 2300	Motorists refused to be interviewed
15	NLEX, San Fernando Interchange (Inbound to NLEX)	Northbound	0500 - 0600	Traffic enforcers not yet in the area
		Northbound	2000 - 2200	Motorists refused to be interviewed
		Southbound and Northbound	2200 - 2300	Motorists refused to be interviewed
16	NLEX, Mexico Interchange (Before Angeles Toll)	Southbound In and Northbound In	0500 - 0600	Traffic enforcers not yet in the area
		Southbound and Northbound	2200 - 2300	Motorists refused to be interviewed

1.7 Summary of Survey Result

1.7.1 Traffic Count

Traffic count results by hour and site, direction are shown Table 1.7-1. and detailed survey results are shown in Appendix B.

Table 1.7-1 Summary of Traffic Count Result

Road Name	Station Code	Station Name	Entrance /Exit	Direction	Traffic Count 18 hours (veh)	Traffic Count 24 hours (veh)
MacArthur Highway	1	Telabastagan, San Fernando Pampanga	-	Southbound	14,004	-
				Northbound	13,710	-
				Total	27,714	-
	2	Bgy. Wakas Bocaue, Bulacan	-	Southbound	5,972	-
				Northbound	6,228	-
				Total	12,200	-
NLEX	3	Balintawak Toll	-	Southbound	33,142	-
				Northbound	37,336	-
				Total	70,478	-
	4	Mindanao Ave. Toll	-	Entrance	12,320	-
				Exit	12,044	-
				Total	24,364	-
	5	Valenzuela IC	Entrance	Southbound	9,238	-
				Northbound	3,551	-
				Total	12,789	-
			Exit	Southbound	3,894	-
				Northbound	5,804	-
				Total	9,698	-
			Total	Southbound	13,132	-
				Northbound	9,335	-
				Total	22,467	-
	6	Meycauayan IC	Entrance	Southbound	7,866	-
				Northbound	6,097	-
				Total	13,963	-
			Exit	Southbound	888	-
				Northbound	2,507	-
				Total	3,395	-
			Total	Southbound	8,754	-
				Northbound	8,604	-
				Total	17,358	-
	7	Marilao IC	Entrance	Southbound	4,437	-
				Northbound	1,200	-
				Total	5,637	-
Exit			Southbound	1,231	-	
			Northbound	4,538	-	
			Total	5,769	-	
Total			Southbound	5,667	-	
			Northbound	5,738	-	
			Total	11,405	-	
9	Bocaue IC	Entrance	Southbound	4,528	-	
			Northbound	2,993	-	
			Total	7,521	-	
		Exit	Southbound	2,900	-	
			Northbound	4,106	-	
			Total	7,006	-	
		Total	Southbound	7,428	-	
			Northbound	7,099	-	
			Total	14,527	-	
10	Tabang Toll	-	Entrance	8,050	-	
			Exit	7,640	-	
			Total	15,690	-	
11	Balagtas Toll	-	Entrance	4,681	-	
			Exit	4,939	-	
			Total	9,620	-	
12	Sta. Rita IC	Entrance	Southbound	1,948	-	

Road Name	Station Code	Station Name	Entrance /Exit	Direction	Traffic Count 18 hours (veh)	Traffic Count 24 hours (veh)
			Entrance	Northbound	1,032	-
				Total	2,980	-
				Exit	Southbound	1,593
			Exit	Northbound	1,788	-
				Total	3,381	-
				Total	Southbound	3,541
	13	Pulilan IC	Entrance	Southbound	1,788	-
				Northbound	2,163	-
				Total	3,951	-
			Exit	Southbound	2,100	-
				Northbound	1,775	-
				Total	3,875	-
	Total	Southbound	3,888	-		
		Northbound	3,938	-		
		Total	7,826	-		
	14	San Simon IC	Entrance	Southbound	2,763	-
				Northbound	1,577	-
				Total	4,340	-
			Exit	Southbound	1,701	-
				Northbound	2,012	-
				Total	3,713	-
Total	Southbound	4,464	-			
	Northbound	3,589	-			
	Total	8,053	-			
15	San Fernando IC	Entrance	Southbound	7,953	-	
			Northbound	2,742	-	
			Total	10,695	-	
		Exit	Southbound	2,913	-	
			Northbound	6,986	-	
			Total	9,899	-	
Total	Southbound	10,866	-			
	Northbound	9,728	-			
	Total	20,594	-			
16	Mexico IC	Entrance	-	1,552	-	
		Exit	-	1,379	-	
		Total	-	2,931	-	
17	Angeles IC	Entrance	-	4,644	-	
		Exit	-	4,174	-	
		Total	-	8,818	-	
19	Dau IC	Entrance	-	5,742	-	
		Exit	-	6,534	-	
		Total	-	12,276	-	
25	Bridge at Apalit	-	Southbound	21,029	-	
		-	Northbound	20,654	-	
		-	Total	41,683	-	
26	Bridge at Angeles	-	Southbound	-	15,537	
		-	Northbound	-	17,980	
		-	Total	-	33,517	
27	Dau Access Road	Entrance	-	4,580	-	
		Exit	-	4,260	-	
		Total	-	8,840	-	
28	Sta. Ines Access Road	Entrance	Southbound	1,888	-	
			Northbound	1,423	-	
			Total	3,311	-	
		Exit	Southbound	1,466	-	
			Northbound	1,728	-	
			Total	3,194	-	
Total	Southbound	3,354	-			
	Northbound	3,151	-			
	Total	6,505	-			
Clark airport	24	Clark Airport	Entrance	-	2,280	
			Exit	-	2,215	
			Total	-	4,495	

1.7.2 Vehicle Occupancy Count

The average vehicle occupancy of each type vehicle by hour and site, direction are shown Table 1.7-2 and detailed survey results are shown in Appendix B

Table 1.7-2 Summary of Vehicle Occupancy Count Result

Road Name	Station Code	Station Name	Entrance /Exit	Direction	Car	Private or public Van	AUV -public FX/ Jeepney	All Buses	
MacArthur Highway	1	Telabastagan, San Fernando Pampanga	-	Southbound	1.73	2.74	8.75	30.5	
				Northbound	1.59	2.54	6.79	16.56	
				Both	1.64	2.62	7.78	18.11	
	2	Bgy. Wakas, Bocaue, Bulacan	-	Southbound	1.81	2.57	9.35	0.00	
				Northbound	1.73	2.57	7.26	1.67	
				Both	1.76	2.57	8.25	1.67	
NLEX	3	Balintawak Toll	-	Southbound	1.80	9.44	18.46	48.44	
				Northbound	2.11	5.49	15.17	21.47	
				Both	1.95	7.52	16.75	33.41	
	4	Mindanao Ave. Toll	Entrance	-		1.88	2.92	16.64	51.29
					Exit	1.44	2.40	0.00	33.02
					Both	1.67	2.65	16.64	45.44
	5	Valenzuela IC	Entrance	Southbound	1.48	2.71	17.46	56.14	
				Northbound	1.69	3.09	10.56	21.54	
				Both	1.51	2.83	14.73	52.52	
	6	Meycauayan IC	Entrance	Southbound	1.46	4.86	14.73	28.90	
				Northbound	1.57	2.82	12.49	12.47	
				Both	1.50	3.81	13.78	24.00	
	7	Marilao IC	Entrance	Southbound	2.00	3.60	20.97	54.84	
				Northbound	1.47	2.11	17.51	41.56	
				Both	1.82	3.39	19.75	53.87	
	9	Bocaue IC	Entrance	Southbound	1.57	4.20	17.51	51.07	
				Northbound	1.86	4.90	21.84	36.61	
				Both	1.71	4.49	19.69	48.64	
	10	Tabang Toll	Entrance	-	1.44	8.83	23.02	38.93	
	11	Balagtas Toll	Entrance	-	1.63	3.70	18.36	30.23	
	12	Sta. Rita IC	Entrance	Southbound	1.90	5.14	6.00	50.26	
				Northbound	1.92	8.35	14.67	13.29	
				Both	1.91	5.90	8.36	49.51	
	13	Pulilan IC	Entrance	Southbound	1.89	6.08	8.10	11.78	
				Northbound	2.12	5.27	6.45	14.54	
				Both	2.01	5.69	7.60	14.08	
	14	San Simon IC	Entrance	Southbound	1.72	2.33	0.00	40.27	
				Northbound	1.73	4.10	16.87	24.19	
Both				1.72	2.75	16.87	38.73		
15	San Fernando IC	Entrance	Southbound	1.83	4.33	12.18	35.94		
			Northbound	1.76	4.92	24.42	30.56		
			Both	1.81	4.42	18.17	35.45		
16	Mexico IC	Entrance	Southbound	1.68	2.58	10.00	0.00		
			Northbound	1.42	1.92	15.00	60.00		
			Both	1.56	2.27	11.21	60.00		
17	Angeles IC	Entrance	-	1.43	1.60	17.40	39.08		
27	Dau Access Road	Entrance	-	1.70	5.31	22.24	30.99		
28	Sta. Ines Access Road	Entrance	Southbound	1.84	3.36	0.00	56.78		
			Northbound	1.58	2.39	16.61	29.32		
			Both	1.75	3.03	16.61	34.70		
Clark Airport	24	Clark airport	Entrance		2.30	3.40	7.02	8.75	
			Exit		1.86	2.70	6.02	9.35	
			Both		2.07	3.09	6.55	9.05	

1.7.3 Roadside Interview

Vehicle sample rate of each type vehicle by hour and site, direction is shown Table 1.7-3. and detailed survey results are shown in Appendix B.

Table 1.7-3 Summary of Roadside Interview Result

Road Name	Station Code	Station Name	Entrance /Exit	Direction	Car (%)	Private or Public Van (%)	AUV -Public FX/ Jeepney (%)	All Buses (%)	
MacArthur Highway	1	Telabastagan, San Fernando Pamp.	-	Southbound	4.1	2.3	2.4	5.6	
				Northbound	2.5	0.7	2.8	12.5	
				Both	3.3	1.2	2.6	9.1	
	2	Bgy. Wakas Bocaue, Bulacan	-	Southbound	15.4	7.6	6.8	0.0	
				Northbound	6.1	5.6	6.7	0.0	
			Both	10.8	6.6	6.7	0.0		
NLEX	3	Balintawak Toll	-	Southbound	No RIS Conducted				
				Northbound					
				Both					
	4	Mindanao Ave. Toll	Entrance Exit Both	-	No RIS Conducted				
	5	Valenzuela IC	Entrance	Southbound	4.4	2.0	15.6	11.0	
				Northbound	8.7	3.7	1.6	0.0	
				Both	6.6	2.8	8.6	11.0	
	6	Meycauayan IC	Entrance	Southbound	9.5	5.8	6.0	0.0	
				Northbound	7.3	0.5	4.7	0.0	
				Both	8.4	3.2	5.4	0.0	
	7	Marilao IC	Entrance	Southbound	17.0	6.8	3.9	27.1	
				Northbound	14.3	6.3	3.0	-	
				Both	15.6	13.1	3.4	27.1	
	9	Bocaue IC	Entrance	Southbound	21.7	6.3	22.9	8.7	
				Northbound	15.4	8.8	10.7	-	
				Both	18.6	7.6	16.8	8.7	
	10	Tabang Toll	Entrance	-	5.3	2.4	23.6	10.6	
	11	Balagtas Toll	Entrance	-	5.0	24.8	40.9	33.3	
12	Sta. Rita IC	Entrance	Southbound	19.1	24.8	100.0	0.0		
			Northbound	10.6	49.2	100.0	0.0		
			Both	14.8	37.0	100.0	0.0		
13	Pulilan IC	Entrance	Southbound	18.7	17.9	100.0	0.0		
			Northbound	19.0	20.2	18.2	0.0		
			Both	18.8	19.0	59.1	0.0		
14	San Simon IC	Entrance	Southbound	30.0	3.2	-	25.2		
			Northbound	19.6	11.7	28.1	33.3		
			Both	24.8	7.4	28.1	29.2		
15	San Fernando IC	Entrance	Southbound	3.5	1.7	0.3	8.6		
			Northbound	1.6	2.6	3.7	30.7		
			Both	2.6	2.2	2.0	19.6		
16	Mexico IC	Entrance	-	29.1	15.2	-	-		
17	Angeles IC	Entrance	-	18.9	1.2	37.3	31.0		
27	Dau Access Road	Entrance	-	12.8	7.3	9.5	13.5		
28	Sta. Ines Access Road	Entrance	-	45.8	24.2	27.1	4.7		
Clark Airport	24	Clark Airport	Entrance	-	4.3	-	-	-	



# 2 AIRPORT SURVEYS

## 2.1 Survey Items

The following items were obtained from this survey:

- Flight list with number of passengers
- Number of airport workers

## 2.2 Survey Method

Departing passengers, airport workers and well-wishers were interviewed at passenger terminals in NAIA and Clark, on sampling basis, using the interview forms shown in Appendix A.

## 2.3 Survey Result

Summary tables are shown in Appendix B.

### 2.3.1 NAIA Flight List With Number of Passengers

The flight data for NAIA terminals 1, 2, 3 and 4 are shown in Tables 2.1 to 2.12.

**Table 2.1: NAIA Terminal 1 Flight Data - Arrival**

Date	No.	Flight No.	Routing	Total Pax	No.	Flight No.	Routing	Total Pax
Oct-24	1	OZ 705	PUS	74	29	SQ 916	SIN	108
	2	JQ 79	DRW	143	30	HA 455	HON	192
	3	CI 711	KHH	54	31	KL 807	AMS/TPE	193
	4	QR 648	DOH	232	32	CZ 397	CAN	84
	5	CI 701	TPE	116	33	CX 903	HKG	269
	6	CX 907	HKG	262	34	QF 019	SYD	121
	7	3K 761	SIN	129	35	KA 931	HKG	44
	8	KE 621	ICN	182	36	3K 765	SIN	141
	9	GF 154	BAH	249	37	SQ 918	SIN	230
	10	OZ 701	ICN	231	38	UA 183	GUM	152
	11	CZ 3091	CAN	68	39	MH 804	KUL	93
	12	CX 901	HKG	277	40	TR 2726	SIN	DLYD
	13	BR 271	TPE	167	41	JQ 78	NRT	173
	14	TG 620	BKK	202	42	JL 745	NRT	236
	15	SV 872	JED	285	43	CZ 377	PEK/XMN	123
	16	SQ 910	SIN	260	44	EK 334	DXB	428
	17	JL 741	NRT	115	45	KE 623	ICN	241
	18	MH 704	KUL	143	46	DL 173	JFK/NRT	376
	19	EY 424	AUH	407	47	CX 913	HKG	177
	20	CI 703	TPE	129	48	EY 428	AUH	403
	21	SQ 912	SIN	160	49	AR 644	DOH	224
	22	SV 860	RUH	338	50	UA 193	ROR	98
	23	KU 411	KWI	191	51	OZ 703	ICN	160
	24	QR 646	DOH	374	52	7C 2301	ICN	101
	25	EK 332	DXB	431	53	DL 629	DTW/NGO	354
	26	CX 919	HKG	276	54	BI 689	BWN	79
	27	GF 156	BAH	250	55	CX 905	HKG	161
	28	MH 802	KUL	54				

**Table 2.2: NAIA Terminal 1 Flight Data - Departure**

Date	No.	Flight No.	Dest'n	Total Pax	No.	Flight No.	Destination	Total Pax
Oct-24	1	OZ 706	PUS	90	29	SQ 919	SIN	144
	2	CX 904	HKG	337	30	CX 918	HKG	270
	3	CA 180	PEK	127	31	SV 871	RUH	340
	4	DL 630	NGO/DTW	-	32	QR 647	DOH	325
	5	JQ 79	NRT	148	33	EK 333	DXB	276
	6	BI 682	BWN	108	34	MH 803	KUL	88
	7	MH 805	KUL	61	35	GF 157	BAH	235
	8	DL 172	NRT/JFK	375	36	SQ 921	SIN	228
	9	SQ 915	SIN	147	37	EY 423	AUH	389
	10	CZ 378	XMN/PEK	129	38	CZ 398	CAN	62
	11	JL 746	NRT	211	39	KL 808	TPE/AMS	175
	12	CI 712	KHH	102	40	CX 902	HKG	244
	13	3K 762	SIN	143	41	HA 456	HON	212
	14	CI 702	TPE	170	42	QF 020	SYD	210
	15	QR 649	DOH	232	43	KA 932	HKG	132
	16	CX 906	HKG	318	44	3K 766	SIN	147
	17	GF 155	BAH	221	45	QA 192	ROR	138
	18	CZ 3092	CAN	119	46	TR 2727	SIN	DLYD
	19	KE 622	ICN	129	47	JQ 78	DRW	DLYD
	20	CX 900	HKG	251	48	KU 412	KWI	220
	21	OZ 702	ICN	104	49	QA 184	GUM	155
	22	DR 272	TPE	120	50	KE 624	ICN	212
	23	TG 621	BKK	297	51	OZ 704	ICN	168
	24	SQ 917	SIN	131	52	EK 335	DXB	399
	25	JL 742	NRT	129	53	EY 421	AUH	396
	26	SV 869	DMM	320	54	QR 645	DOH	224
	27	MH 705	KUL	82	55	7C 2302	ICN	101
	28	CI 704	TPE	72				

**Table 2.3: NAIA Terminal 2 Flight Data - International Arrival**

Date	No.	Flight no.	Origin	Total Pax	No.	Flight no.	Origin	Total Pax
23-Oct	1	PR311	Hongkong	99	13	PR753	Bangkok	51
	2	PR506	Singapore	133	14	PR502	Singapore	105
	3	PR107	Las Vegas	210	15	PR319	Hongkong	120
	4	PR105	San Francisco	273	16	PR210	Melbourne	118
	5	PR103	Los Angeles	333	17	PR359	Beijing	66
	6	PR111	Guam	118	18	PR731	Bangkok	184
	7	PR467	Incheon	150	19	PR508	Singapore	96
	8	PR427	Nagoya	122	20	PR899	Taipei	88
	9	PR407	Kansai	148	21	PR307	Hongkong	205
	10	PR431	Narita	136	22	PR331	Xiamen	99
	11	PR301	Hongkong	144	23	PR337	Shanghai	105
	12	PR592	Saigon	72	24	PR469	Incheon	121

**Table 2.4: NAIA Terminal 2 Flight Data - International Departure**

Date	No.	Flight No.	Destination	Total Pax	No.	Flight No.	Destination	Total Pax
23-Oct	1	PR896	Taipei	109	12	PR468	Incheon	101
	2	PR511	Singapore	154	13	PR432	Narita	179
	3	PR358	Beijing	90	14	PR501	Singapore	117
	4	PR591	Saigon	79	15	PR106	Las Vegas	178
	5	PR300	Hongkong	214	16	PR310	Hongkong	155
	6	PR507	Singapore	126	17	PR732	Bangkok	155
	7	PR730	Bangkok	221	18	PR102	Los Angeles	216
	8	PR438	Nagoya	144	19	PR503	Singapore	110
	9	PR318	Hongkong	140	20	PR104	San Francisco	151
	10	PR336	Shanghai	82	21	PR535	Jakarta	110
	11	PR306	Hongkong	239	22	PR466	Incheon	133

**Table 2.5: NAIA Terminal 2 Flight Data - Domestic Arrival**

Date	No.	Flight No.	Origin	Total Pax	No.	Flight No.	Origin	Total Pax
23-Oct	1	PR132	Bacolod	142	23	PR812	Davao	341
	2	PR140	Iloilo	124	24	PR478	Butuan	118
	3	PR190	Roxas	97	25	PR144	Iloilo	129
	4	PR844	Cebu	136	26	PR324	Kalibo	-
	5	PR124	Zamboanga	107	27	PR240	Kalibo	-
	6	PR278	Legazpi	89	28	PR294	Dumaguete	81
	7	PR820	Davao	145	29	PR858	Cebu	147
	8	PR282	Cagayan	129	30	PR158	Bacolod	154
	9	PR292	Dumaguete	77	31	PR186	Cagayan	119
	10	PR848	Cebu	237	32	PR178	Tagbilaran	140
	11	PR196	P. Princesa	105	33	PR198	P. Princesa	106
	12	PR134	Bacolod	144	34	PR284	Cagayan	91
	13	PR142	Iloilo	130	35	PR850	Cebu	286
	14	PR454	Gensan	196	36	PR326	Kalibo	-
	15	PR322	Kalibo	-	37	PR394	Tacloban	117
	16	PR168	Dipolog	86	38	PR136	Bacolod	135
	17	PR176	Tagbilaran	122	39	PR824	Davao	241
	18	PR392	Tacloban	126	40	PR126	Zamboanga	91
	19	PR854	Cebu	244	41	PR146	Iloilo	104
	20	PR227	Laoag	115	42	PR864	Cebu	138
	21	PR184	Cagayan	144	43	PR874	Cebu	117
	22	PR188	Cotabato	98	44	PR822	Davao	88

**Table 2.6: NAIA Terminal 2 Flight Data – Domestic Departure**

Date	No.	Flight No.	Destination	Total Pax	No.	Flight No.	Destination	Total Pax
23-Oct	1	PR819	Davao	127	23	PR226	Laoag	99
	2	PR131	Bacolod	110	24	PR477	Butuan	107
	3	PR123	Zamboanga	109	25	PR857	Cebu	156
	4	PR139	Iloilo	88	26	PR143	Iloilo	110
	5	PR843	Cebu	257	27	PR185	Cagayan	115
	6	PR189	Roxas	88	28	PR323	Kalibo	80
	7	PR281	Cagayan	140	29	PR293	Dumaguete	81
	8	PR277	Legazpi	139	30	PR157	Bacolod	120
	9	PR847	Cebu	300	31	PR283	Cagayan	94
	10	PR453	Gensan	216	32	PR393	Tacloban	99
	11	PR291	Dumaguete	73	33	PR849	Cebu	276
	12	PR195	P. Princesa	141	34	PR177	Tagbilaran	141
	13	PR133	Bacolod	137	35	PR197	P. Princesa	85
	14	PR141	Iloilo	119	36	PR325	Kalibo	52
	15	PR321	Kalibo	95	37	PR813	Davao	261
	16	PR187	Cotabato	97	38	PR125	Zamboanga	93
	17	PR175	Tagbilaran	133	39	PR135	Bacolod	128
	18	PR167	Dipolog	105	40	PR145	Iloilo	111
	19	PR853	Cebu	288	41	PR863	Cebu	135
	20	PR183	Cagayan	148	42	PR873	Cebu	118
	21	PR391	Tacloban	109	43	PR821	Davao	128
	22	PR811	Davao	390	44	PR855	Cebu	86

**Table 2.7: NAIA Terminal 3 Flight Data – International Arrival**

Date	No.	Flight No.	Origin	Total Pax	No.	Flight No.	Origin	Total Pax
24-Oct	1	2P258	REP	144	14	5J502	KUL	111
	2	2P801	SIN	148	15	5J673	PEK	84
	3	2P876	KUL	87	16	5J679	PVG	88
	4	5J109	HKG	115	17	5J734	BKI	91
	5	5J111	HKG	140	18	5J745	HAN	99
	6	5J119	HKG	128	19	5J752	SGN	61
	7	5J143	HKG	149	20	5J800	SIN	152
	8	5J191	ICN	58	21	5J802	SIN	155
	9	5J195	ICN	119	22	5J804	SIN	161
	10	5J311	TPE	133	23	5J806	SIN	167
	11	5J363	MFM	91	24	5J932	BKK	112
	12	5J410	BWM	66	25	NH949	NRT	209
	13	5J500	KUL	118	26	Z2885	ICN	121

**Table 2.8: NAIA Terminal 3 Flight Data – International Departure**

Date	No.	Flight No.	Destination	Total Pax	No.	Flight No.	Destination	Total Pax
24-Oct	1	2P800	SIN	130	13	5J501	KUL	137
	2	5J108	HKG	162	14	5J678	PVG	101
	3	5J110	HKG	161	15	5J751	SGN	136
	4	5J118	HKG	140	16	5J759	CGK	119
	5	5J142	HKG	170	17	5J799	SIN	163
	6	5J184	PUS	96	18	5J803	SIN	160
	7	5J190	ICN	109	19	5J805	SIN	158
	8	5J194	ICN	104	20	5J931	BKK	158
	9	5J288	CAN	124	21	NH950	NRT	209
	10	5J310	TPE	139	22	Z2018	PVG	31
	11	5J362	MFM	107	23	Z2884	ICN	132
	12	5J499	KUL	152				

Table 2.9: NAIA Terminal 3 Flight Data - Domestic Arrival

Date	No.	Flight No.	Origin	Total Pax	No.	Flight No.	Origin	Total Pax
24-Oct	1	2P015	TUG	64	57	5J384	CGY	138
	2	2P022	MBT	55	58	5J386	CGY	177
	3	2P030	CRM	68	59	5J390	CGY	163
	4	2P032	USU	48	60	5J392	CGY	155
	5	2P034	USU	51	61	5J396	CGY	165
	6	2P040	MPH	40	62	5J405	LAO	51
	7	2P042	SJI	54	63	5J450	ILO	122
	8	2P046	MPH	31	64	5J452	ILO	162
	9	2P048	MPH	0	65	5J454	ILO	174
	10	2P052	MPH	29	66	5J456	ILO	153
	11	2P056	MPH	29	67	5J458	ILO	160
	12	2P062	MPH	78	68	5J460	ILO	160
	13	2P066	SUG	0	69	5J474	BCD	181
	14	2P072	MPH	54	70	5J476	BCD	170
	15	2P074	MPH	28	71	5J478	BCD	145
	16	2P076	MPH	45	72	5J480	BCD	171
	17	2P078	MPH	0	73	5J482	BCD	122
	18	2P082	KLO	131	74	5J505	TUG	153
	19	2P092	CYP	63	75	5J514	SJI	150
	20	2P264	WNP	71	76	5J522	WNP	57
	21	2P266	WNP	76	77	5J532	USU	58
	22	2P388	LAO	78	78	5J540	USU	47
	23	2P870	CGY	152	79	5J552	CEB	144
	24	2P910	BCD	148	80	5J554	CEB	122
	25	2P914	BCD	157	81	5J556	CEB	52
	26	2P926	LGP	119	82	5J560	CEB	157
	27	2P928	CEB	156	83	5J562	CEB	171
	28	2P929	CEB	152	84	5J564	CEB	153
	29	2P931	CEB	147	85	5J566	CEB	122
	30	2P934	CEB	153	86	5J570	CEB	164
	31	2P940	OZC	158	87	5J572	CEB	138
	32	2P942	PPS	149	88	5J574	CEB	142
	33	2P944	PPS	137	89	5J578	CEB	134
	34	2P948	PPS	167	90	5J580	CEB	151
	35	2P952	ILO	150	91	5J582	CEB	144
	36	2P954	ILO	160	92	5J586	CEB	134
	37	2P958	TAG	146	93	5J618	TAG	146
	38	2P960	CBO	153	94	5J626	DGT	106
	39	2P966	CGY	164	95	5J628	DGT	113
	40	2P970	KLO	143	96	5J630	DGT	130
	41	2P978	TAC	144	97	5J638	PPS	159
	42	2P982	DVO	133	98	5J640	PPS	159
	43	2P984	DVO	140	99	5J644	PPS	176
	44	2P988	DVO	133	100	5J652	TAC	172
	45	2P990	GES	146	101	5J654	TAC	0
	46	2P994	ZAM	129	102	5J658	TAC	0
	47	2P998	ZAM	148	103	5J660	TAC	0
	48	5J197	CYZ	107	104	5J704	DPL	146
	49	5J324	LGP	120	105	5J772	PAG	143
	50	5J326	LGP	119	106	5J782	OZC	174
	51	5J328	LGP	141	107	5J786	BXU	0
	52	5J336	KLO	0	108	5J788	BXU	0
	53	5J340	KLO	0	109	5J852	ZAM	162
	54	5J346	KLO	70	110	5J856	ZAM	144
	55	5J374	RXS	172	111	5J888	CBO	183
	56	5J382	CGY	154	112	5J892	MPH	7

Cont... Table 2.9

Date	No.	Flight No.	Origin	Total Pax	No.	Flight No.	Origin	Total Pax
24-Oct	113	5J894	MPH	12	123	5J920	MPH	144
	114	5J896	MPH	16	124	5J960	DVO	151
	115	5J898	MPH	11	125	5J962	DVO	171
	116	5J900	MPH	22	126	5J964	DVO	162
	117	5J902	MPH	17	127	5J968	DVO	179
	118	5J906	MPH	12	128	5J970	DVO	181
	119	5J908	MPH	10	129	5J972	DVO	176
	120	5J910	MPH	20	130	5J974	DVO	175
	121	5J912	MPH	15	131	5J992	GES	174
	122	5J914	MPH	17	132	5J996	GES	168

Table 2.10: NAIA Terminal 3 Flight Data - Domestic Departure

Date	No.	Flight no.	Origin	Total Pax	No.	Flight no.	Origin	Total Pax
24-Oct	1	2P 104	TUG	53	50	5J 325	LGP	119
	2	2P 021	MBT	31	51	5J 327	LGP	134
	3	2P 029	CRM	76	52	5J 339	KLO	144
	4	2P 031	USU	48	53	5J 345	KLO	67
	5	2P 033	USU	53	54	5J 353	KLO	-
	6	2P 039	MPH	25	55	5J 355	KLO	-
	7	2P 041	SJI	49	56	5J 373	RXS	166
	8	2P 045	MPH	37	57	5J 381	CGY	169
	9	2P 047	MPH	21	58	5J 383	CGY	160
	10	2P 051	MPH	44	59	5J 385	CGY	181
	11	2P 055	MPH	25	60	5J 389	CGY	184
	12	2P 061	MPH	25	61	5J 391	CGY	149
	13	2P 065	SUG	-	62	5J 395	CGY	177
	14	2P 071	MPH	38	63	5J 404	LAO	66
	15	2P 073	MPH	29	64	5J 449	ILO	169
	16	2P 075	MPH	38	65	5J 451	ILO	166
	17	2P 077	MPH	-	66	5J 453	ILO	170
	18	2P 081	KLO	92	67	5J 455	ILO	180
	19	2P 091	CYP	66	68	5J 457	ILO	169
	20	2P 263	WNP	66	69	5J 459	ILO	173
	21	2P 265	WNP	67	70	5J 473	BCD	169
	22	2P 387	LAO	56	71	5J 475	BCD	156
	23	2P 869	CGY	162	72	5J 477	BCD	150
	24	2P 909	BCD	162	73	5J 479	BCD	166
	25	2P 913	BCD	165	74	5J 481	BCD	153
	26	2P 924	CEB	163	75	5J 504	TUG	137
	27	2P 925	LGP	129	76	5J 513	SJI	136
	28	2P 927	CEB	132	77	5J 521	WNP	49
	29	2P 930	CEB	170	78	5J 531	USU	65
	30	2P 933	CEB	165	79	5J 539	USU	59
	31	2P 939	OZC	157	80	5J 551	CEB	156
	32	2P 941	PPS	160	81	5J 553	CEB	170
	33	2P 943	PPS	146	82	5J 557	CEB	63
	34	2P 947	PPS	159	83	5J 559	CEB	163
	35	29 951	ILO	164	84	5J 561	CEB	145
	36	29 953	ILO	153	85	5J 563	CEB	174
	37	2P 957	TAG	164	86	5J 565	CEB	152
	38	2P 959	CBO	155	87	5J 569	CEB	159
	39	29 965	CGY	166	88	5J 571	CEB	147
	40	29 969	KLO	139	89	5J 573	CEB	151
	41	2P 977	TAC	153	90	5J 577	CEB	161
	42	2P 981	DVO	169	91	5J 581	CEB	158
	43	2P 983	DVO	163	92	5J 587	CEB	147

Date	No.	Flight no.	Origin	Total Pax
	44	2P 987	DVO	164
	45	2P 989	GES	169
	46	2P 993	ZAM	164
	47	2P 997	ZAM	158
	48	5J 196	CYZ	152
	49	5J 323	LGP	168
	99	5J 643	PPS	161
	100	5J 651	TAC	173
	101	5J 653	TAC	-
	102	5J 657	TAC	-
	103	5J 659	TAC	144
	104	5J 703	DPL	156
	105	5J 771	PAG	151
	106	5J 781	OZC	164
	107	5J 785	BXU	-
	108	5J 787	BXU	-
	109	5J 851	ZAM	165
	110	5J 855	ZAM	160
	111	5J 887	CBO	149
	112	5J 891	MPH	51
	113	5J 893	MPH	44
	114	5J 895	MPH	48
	115	5J 897	MPH	42

No.	Flight no.	Origin	Total Pax
93	5J 617	TAG	138
94	5J 625	DGT	137
95	5J 627	DGT	139
96	5J 629	DGT	131
97	5J 637	PPS	150
98	5J 639	PPS	167
116	5J 899	MPH	61
117	5J 901	MPH	57
118	5J 905	MPH	65
119	5J 907	MPH	47
120	5J 909	MPH	51
121	5J 911	MPH	64
122	5J 913	MPH	54
123	5J 919	MPH	43
124	5J 959	DVO	175
125	5J 961	DVO	175
126	5J 963	DVO	172
127	5J 965	DVO	176
128	5J 969	DVO	166
129	5J 971	DVO	174
130	5J 973	DVO	171
131	5J 991	GES	169
132	5J 995	GES	164

Table 2.11: NAIA Terminal 4 Flight Data – Domestic Arrival

Date	No.	Flight No.	Origin	Total Pax
24-Oct	1	Z2 105	CRK	40
	2	Z2 313	ILO	126
	3	Z2 361	CEB	94
	4	Z2 321	TAC	129
	5	Z2 261	MBT	44
	6	Z2 391	DVO	129
	7	DG 7003	CEB	64
	8	Z2 427	PPS	66
	9	DG 7073	ILO	130
	10	Z2 309	KLO	123
	11	Z2 351	TAG	152
	12	Z2 423	PPS	125
	13	Z2 411	USU	38
	14	Z2 381	CEB	68
	15	DG 7045	TAC	118
	16	Z2 373	KLO	134
	17	Z2 303	KLO	109
	18	DG 7005	CEB	68

No.	Flight No.	Origin	Total Pax
19	Z2 221	LGP	76
20	Z2 203	MRQ	42
21	DG 7025	DVO	74
22	DG 7007	CEB	68
23	Z2 353	TAG	171
24	Z2 273	KLO	116
25	DG 7063	PPS	107
26	Z2 413	USU	33
27	Z2 385	CEB	87
28	DG 7083	BCD	171
29	Z2 421	PPS	88
30	Z2 311	ILO	115
31	DG 7057	KLO	115
32	DG 7015	CEB	91
33	DG 7029	DVO	87
34	Z2 383	CEB	89
35	Z2 393	DVO	108
36	Z2 301	KLO	89

**Table 2.12: NAIA Terminal 4 Flight Data – Domestic Departure**

Date	No.	Flight No.	Destination	Total Pax	No.	Flight No.	Destination	Total Pax
24-Oct	1	Z2 360	CEB	111	19	Z2 300	KLO	111
	2	Z2 390	DVO	156	20	Z2 202	MRQ	34
	3	Z2 312	ILO	118	21	DG 7006	CEB	87
	4	Z2 320	TAC	129	22	Z2 272	KLO	107
	5	Z2 260	MBT	51	23	DG 7062	PPS	125
	6	DG 7002	CEB	92	24	DG 7082	BCD	124
	7	Z2 426	PPS	107	25	Z2 412	USU	54
	8	DG 7072	ILO	115	26	Z2 384	CEB	138
	9	Z2 422	PPS	134	27	Z2 420	PPS	131
	10	Z2 308	KLO	102	28	Z2 310	ILO	157
	11	Z2 350	TAG	165	29	Z2 274	KLO	103
	12	Z2 380	CEB	110	30	DG 7056	KLO	55
	13	Z2 410	USU	56	31	DG 7028	DVO	122
	14	DG 7004	TAC	97	32	Z2 392	DVO	149
	15	DG 7024	DVO	128	33	DG 7014	CEB	115
	16	DG 7004	CEB	81	34	Z2 382	CEB	143
	17	Z2 220	LGP	88	35	Z2 352	TAG	163
	18	Z2 322	TAC	105				

**2.3.2 Clark Airport Flight List With Number of Passengers**

The flight data for Clark International Airport are shown in Tables 2.13 to 2.16.

**Table 2.13: Clark Airport Flight Data – International Arrival**

Date	No.	Flight No.	Origin	Total Pax	No.	Flight No.	Origin	Total Pax
19-Oct	1	OZ 707	Incheon	167	10	2P780	Hongkong	82
	2	KA373	Hongkong	65	11	DG7929	Hongkong	122
	3	AK1438	Kuala Lumpur	137	12	PQ7311	Macau	107
	4	PQ7306	Hongkong	84	13	DG7213	Bangkok	100
	5	5J149	Hongkong	94	14	PQ7456	Kuala Lumpur	89
	6	DG7925	Hongkong	64	15	5J371	Macau	102
	7	DG7793	Singapore	132	16	OZ 707	Incheon	134
	8	AK6264	Kota Kinabalu	93	17	LJ003	Incheon	156
	9	5J538	Singapore	98				

**Table 2.14: Clark Airport Flight Data – International Departure**

Date	No.	Flight No.	Destination	Total Pax	No.	Flight No.	Destination	Total Pax
19-Oct	1	OZ 708	Incheon	61	9	AK6265	Kota Kinabalu	32
	2	5J150	Hongkong	125	10	DG 7212	Bangkok	133
	3	PQ7305	Hongkong	121	11	2P779	Hongkong	98
	4	DG7924	Hongkong	135	12	PQ7310	Macau	75
	5	DG 7792	Singapore	81	13	5J370	Macau	125
	6	KA376	Hongkong	133	14	DG7928	Hongkong	101
	7	AK1439	Kuala Lumpur	110	15	OZ 708	Incheon	96
	8	PQ7015	Singapore	142	16	LJ004	Incheon	135

**Table 2.15: Clark Airport Flight Data – Domestic Arrival**

Date	No.	Flight No.	Origin	Total Pax	No.	Flight No.	Origin	Total Pax
19-Oct	1	1	PQ7002	Kalibo	5	5	DG7403	Kalibo
	2	2	2P770	Cebu	6	6	2P774	Kalibo
	3	3	PQ7024	Davao	7	7	PQ7006	Kalibo
	4	4	PQ7016	Kalibo	8	8	5J608	Cebu



**Table 2.16: Clark Airport Flight Data – Domestic Departure**

Date	No.	Flight No.	Destination	Total Pax	No.	Flight No.	Destination	Total Pax
19-Oct	1	PQ7001	Kalibo	108	6	PQ7005	Kalibo	74
	2	2P769	Cebu	118	7	2P773	Kalibo	147
	3	PQ7023	Davao	83	8	5J609	Cebu	120
	4	DG7402	Kalibo	123	9	2P771	Davao	124
	5	PQ7455	Davao	134				

**2.3.3 Number of Workers**

**2.3.3.1 Ninoy Aquino International Airport**

The numbers of employees worked at NAIA Terminals 1, 2, 3 and 4 is shown in Table 2.17.

**Table 2.17: Airport Workers Data**

Type of Workers	Terminal 1	Terminal 2	Terminal 3	Terminal 4	Total	Data Source
MIAA Organic - Employees	866	163	59	33	1,121	MIAA Office
Non-Organic Employees	300	304	468	116	1,188	MIAA Office
Janitorial	60	80	366	20	526	MIAA Office
Airline Employees	366	1236	1030	85	2,717	Airline Offices
Police	100	40	33	11	184	Police Airport Office
Security Guards	90	120	66	22	298	Security Airport Office
<b>TOTAL</b>	<b>1782</b>	<b>1943</b>	<b>2022</b>	<b>287</b>	<b>6,034</b>	

Note: Non-Organic composed of Immigration, customs, contractors/subcontractor and concessionaries of MIAA as of October 2012

**2.3.3.2 Clark International Airport**

The numbers of employees worked at Clark Airport Terminal is shown in Table 2.18.

**Table 2.18: Airport Workers Data (Clark Airport)**

Type of Employees	Number	Data Source
Organic	347	CIAC
Non-Organic	56	CIAC
Janitorial	-	N.A
Police	-	N.A
Security	-	N.A
Airline Employees	-	N.A
<b>Total</b>	<b>403</b>	

Note: Non-Organic is composed of contractors/subcontractors and concessionaires of CIAC as of October 2012

## 3 ON-BOARD BUS SURVEY

### 3.1 Survey Items

The following items were observed during the on-board survey of buses:

- Passenger trip information (e.g., origin and destination, purpose, mode etc.)
- Bus Information (e.g., route origin and destination, number of passengers, seating capacity etc.)

### 3.2 Survey Method

Two types of interviews were conducted, one for public mode passengers and the others was for public mode drivers.

For public mode passengers, trip origin and destination, trip purpose, home address of interviewee, total fare paid from origin to destination were gathered. For public drivers, data on number of passengers and seating capacity, route origin and destination were gathered. The survey duration was 14 hours. Survey form used is shown in **Appendix A**.

### 3.3 Surveyed Bus Routes .

Surveyed bus routes are shown in Figures 3.3-1 to 3.3-4.

### 3.4 Survey Days

The survey was conducted on 29<sup>th</sup> and 30<sup>th</sup> of October and 3<sup>rd</sup> of November 2012.

### 3.5 Survey Result

The numbers of buses surveyed and number of passengers interviewed are shown in Tables 3.3-1 to 3.3-4.

Figure 3.3-1 Surveyed Bus Routes in Bulacan Area

### Alignment Options (North)

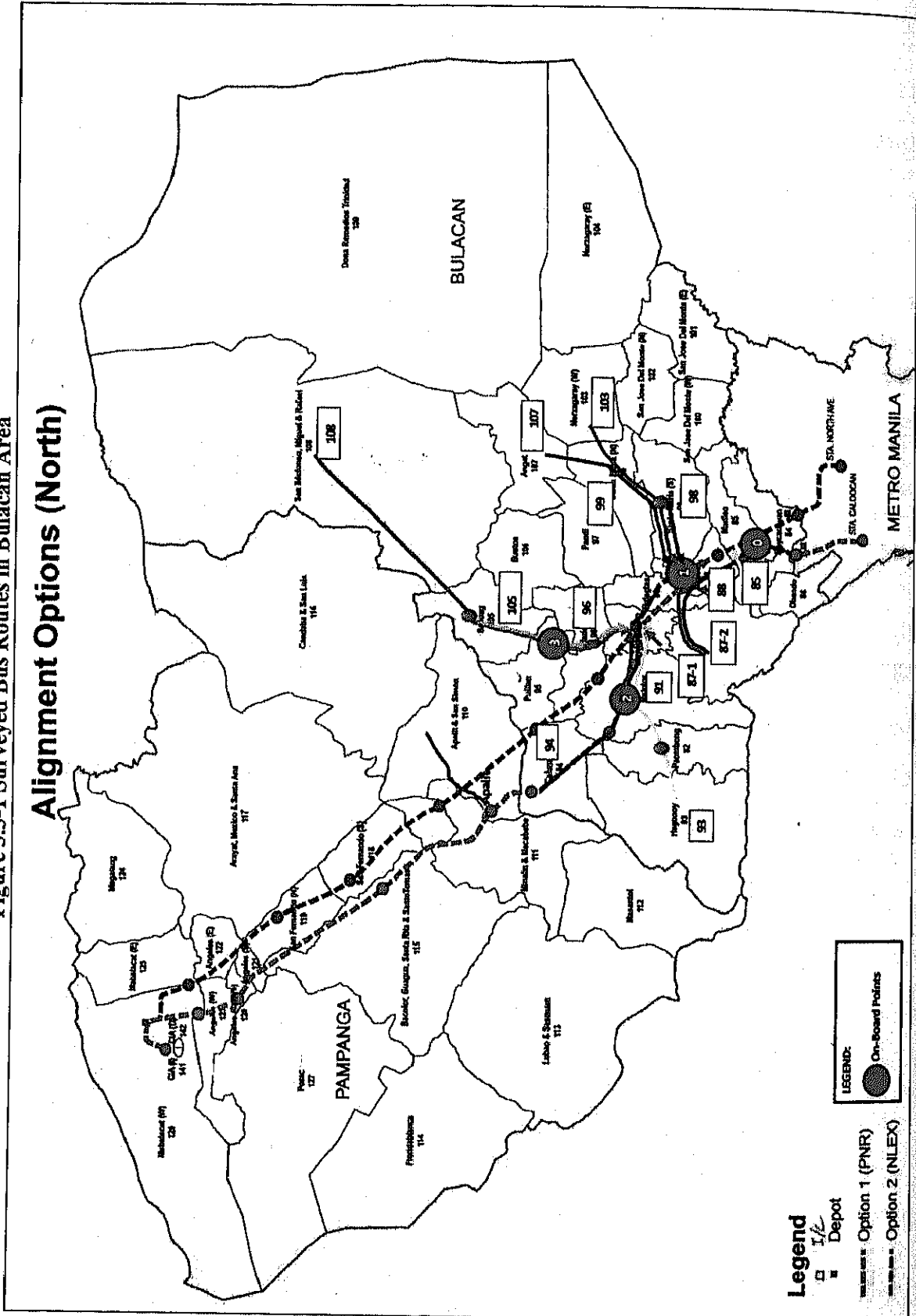


Figure 3.3-2 Surveyed Bus Routes in Pampanga Area Alignment Options (North)

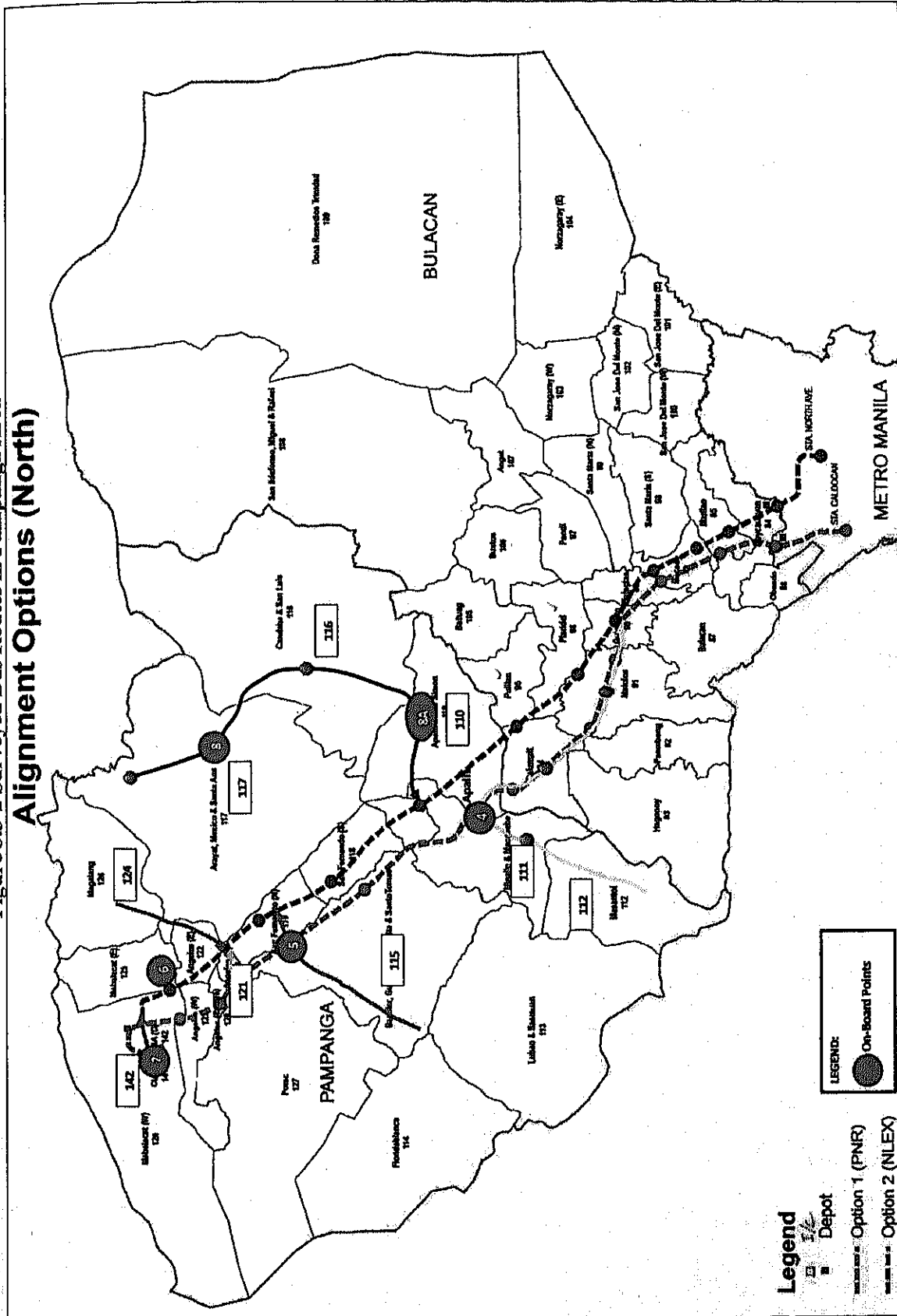




Figure 3.3-4 Surveyed Bus Routes in Region 1, 2 and CAR Areas

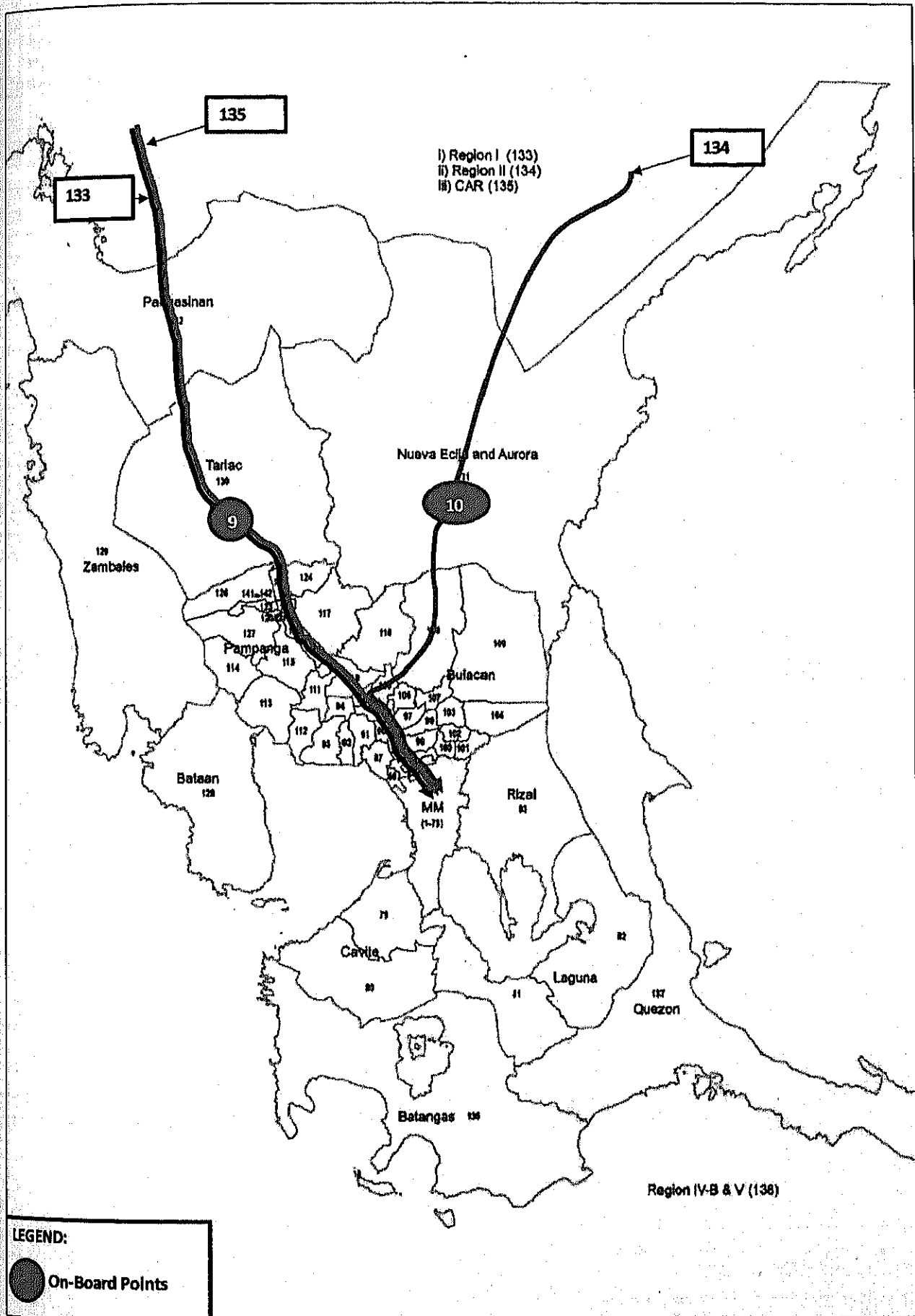


Table 3.3-1: Bus Routes Surveyed in Bulacan Area

ORIGIN			DESTINATION	Number of Buses Surveyed	Number of Passengers Interviewed
Region	Province	City/Municipality			
3	Bulacan	Marilao	Muntinlupa City	1	10
3	Bulacan	Bulacan	Quezon City	2	20
3	Bulacan	Bulacan	Manila City	6	62
3	Bulacan	Balagtas	Manila City	7	70
3	Bulacan	Malolos	Quezon City	3	30
3	Bulacan	Hagonoy	Pasay City	7	70
3	Bulacan	Hagonoy	Quezon City	3	46
3	Bulacan	Calumpit	Caloocan City	2	20
3	Bulacan	Pulilan	Quezon City	4	40
3	Bulacan	Plaridel	Quezon City	4	40
3	Bulacan	Santa Maria	Quezon City	3	28
3	Bulacan	San Jose del Monte	Manila City (Sta. Cruz)	3	40
3	Bulacan	Baliwag	Pasay City	2	20
3	Bulacan	Baliwag	Quezon City	9	96
3	Bulacan	Baliwag	Caloocan City	4	40
3	Bulacan	Angat	Manila City	8	80
3	Bulacan	San Miguel	Manila City	4	40
3	Bulacan	San Miguel	Caloocan City	4	40
3	Bulacan	San Rafael	Caloocan City	4	40
TOTAL				80	832

Table 3.3-2: Bus Routes Surveyed in Pampanga Area

ORIGIN			DESTINATION	Number of Buses Surveyed	Number of Passengers Interviewed
Region	Province	City/Municipality			
3	Pampanga	Apalit	Manila City	2	14
3	Pampanga	Apalit	Pasay City	6	44
3	Pampanga	Apalit	Caloocan City	3	32
3	Pampanga	Apalit	Caloocan City	4	28
3	Pampanga	Masantol	Manila City	3	16
3	Pampanga	Guagua	Caloocan City	2	31
3	Pampanga	Guagua	Manila City	18	181
3	Pampanga	Guagua	Cavite City	1	7
3	Pampanga	Candaba	Quezon City	4	28
3	Pampanga	Arayat	Caloocan City	5	54
3	Pampanga	San Fernando	Manila City	5	50
3	Pampanga	San Fernando	Pasay City	12	165
3	Pampanga	San Fernando	Quezon City	10	100
3	Pampanga	San Fernando	Caloocan City	6	76
3	Pampanga	Angeles	Manila City	1	10
3	Pampanga	Angeles	Quezon City	1	6
3	Pampanga	Angeles	Caloocan City	7	42
3	Pampanga	Mabalacat (Dau)	Pasay City	8	46
TOTAL				98	930

**Table 3.3-3: Bus Routes Surveyed in Other Region 3 Areas**

Region	ORIGIN		DESTINATION	Number of Buses Surveyed	No. of Passengers Interviewed
	Province	City/Municipality			
3	Bataan	Balanga	Manila City	5	34
3	Bataan	Balanga	Pasay City	5	30
3	Bataan	Balanga	Quezon City	16	178
3	Bataan	Mariveles	Manila City	6	42
3	Bataan	Mariveles	Pasay City	5	18
3	Bataan	Mariveles	Quezon City	9	70
3	Zambales	Iba	Manila City	2	7
3	Zambales	Olongapo	Quezon City	1	10
3	Zambales	Olongapo City	Caloocan City	11	104
3	Zambales	Olongapo City	Pasay City	5	46
3	Zambales	Sta Cruz	Quezon City	1	10
3	Zambales	Olongapo City	Manila City	2	18
3	Tarlac	Tarlac	Manila City	3	24
3	Tarlac	Tarlac	Pasay City	2	20
3	Tarlac	Tarlac	Pasay City	5	48
3	Tarlac	Tarlac	Quezon City	4	38
3	Nueva Ecija	Cabanatuan City	Caloocan City	2	20
3	Nueva Ecija	Cabanatuan City	Pasay City	1	10
3	Nueva Ecija	Cabanatuan City	Quezon City	12	112
3	Nueva Ecija	Cabiao	Caloocan City	2	28
3	Nueva Ecija	San Isidro	Caloocan City	24	242
TOTAL				123	1,109

**Table 3.3-4: Bus Routes Surveyed in Regions 1, 2 and CAR Areas**

Region	ORIGIN		DESTINATION	Number of Buses Surveyed	No. of Passengers Interviewed
	Province	City/Municipality			
1	Pangasinan	Alaminos	Quezon City	10	106
1	Pangasinan	Anda	Quezon City	1	6
1	Pangasinan	Bolinao	Quezon City	1	12
1	Pangasinan	Bolinao	Pasay City	2	22
1	Pangasinan	Dagupan City	Manila City	1	14
1	Pangasinan	Dagupan City	Pasay City	9	86
1	Pangasinan	Dagupan City	Quezon City	29	294
1	Pangasinan	Lingayen	Quezon City	2	14
1	Pangasinan	Lingayen	Pasay City	1	14
1	Pangasinan	San Carlos City	Pasay City	6	70
1	Pangasinan	San Carlos City	Quezon City	6	68
1	Pangasinan	San Nicolas	Quezon City	1	12
1	Pangasinan	Urbiztundo	Quezon City	1	10
1	Pangasinan	Agno	Pasay City	1	10
1	Pangasinan	Alaminos-	Pasay City	2	20
1	Pangasinan	Anda	Pasay City	3	28
1	Pangasinan	San Fabian	Pasay City	1	10
1	Pangasinan	Tayug-	Pasay City	1	10
1	Pangasinan	Tayug-	Quezon City	1	10
1	Ilocos Norte	Laoag City	Manila City	4	26
1	Ilocos Sur	Candon	Manila City	3	17
1	Ilocos Sur	Vigan	Manila City	2	11
1	La Union	San Fernando	Pasay City	4	34
CAR	Cagayan	Tuguegarao	Manila City	14	310
CAR	Benguet	Baguio City	Manila City	2	26
CAR	Benguet	Baguio City	Pasay City	7	80
CAR	Benguet	Baguio City	Quezon City	5	38
CAR	Benguet	Baguio City	Mariveles	1	26
TOTAL				121	1,384



## 4 STATED PREFERENCE SURVEY

### 4.1 Survey Items

The following items were observed at MacArthur and NLEX, NAIA, Clark Airport, and provincial buses plying Northern Luzon.

### 4.2 Survey Method

Stated Preference (SP) survey interview was undertaken to gather information of socio-economic profile of passengers and trip information including trip origin and destination, mode, and willingness to pay. This survey was conducted at MacArthur Highway, NLEX, NAIA and Clark Airport and on provincial buses plying to Northern Luzon. For MacArthur and NLEX, private car users were interviewed at roadsides. For NAIA and Clark Airport, passengers and well-wishers were interviewed at each airport terminal. In addition, airport workers were also interviewed from NAIA and Clark airport offices. On board bus passengers' interviews were conducted at the same time the bus drivers were also interviewed. Each SP survey form is Appendix A.

### 4.3 Survey Location and Surveyed Bus Routes

Survey locations are shown in Figures 3.3-1 to 3.3-4 in Chapter 3. Surveyed bus routes are same with on board bus survey.

### 4.4 Survey Day and Duration

Each survey site's survey day and duration are shown in Table 4.4-1

Table 4.4-1 Survey Day and Duration

Type	Site	Survey Date	Survey Duration (Hrs)
MacArthur Highway	Petron (NB)	10/22/12	14
	Petron (SB)	10/22/12	14
NLEX	Petron (NB)	10/22/12	14
	Petron (SB)	10/22/12	14
Clark airport	Terminal 1	10/19/12	24
NAIA	Terminal 1	10/23/12	24
	Terminal 2	10/23/12	24
	Terminal 3	10/24/12	24
	Terminal 4	10/24/12	24
On Board Bus Survey	Selected areas	10/30/12	14
		10/31/12	14
		11/03/12	14

#### 4.5 Survey Result

Number of samples by type and sample site is shown in Table 4.5-1.

**Table 4.5-1 Survey Result**

Type	Site	Total No. of Samples
MacArthur Highway	Petron (NB)	110
	Petron (SB)	88
NLEX	Petron (NB)	251
	Petron (SB)	148
Clark Airport	Terminal 1	416
NAIA	Terminal 1	425
	Terminal 2	451
	Terminal 3	451
	Terminal 4	199
On-Board Bus Survey	Selected areas	422

Summary tables are shown in **Appendix B**.

# 5 JOURNEY TIME SURVEY

## 5.1 Survey Items

The following items were observed at each survey station:

- Travel information on certain road sections: time of departure and arrival (start and end points of route)

## 5.2 Survey Method

This survey was conducted using the “floating car method”, which requires the survey vehicle to keep the same position in the traffic flow; for example, if the survey vehicle is overtaken by other vehicles, it should overtake the same number of vehicles. The survey form is shown in Appendix A. In addition GPS data were also taken to analyze details regarding travel speed.

## 5.3 Survey Route and Duration

Three routes were selected for this survey. One was between Clark Airport and Mindanao Avenue, and the other was between Clark Airport and Balintawak using NLEX. The third route was between EDSA and Clark Airport via MacArthur Highway. Route details are shown in Figure 5.3-1.

Three (3) cars were allocated for NLEX route. One started in Balintawak and Clark Airport and ended in Clark Airport, then back to Balintawak via Mindanao Avenue. After reaching Mindanao Avenue, the survey vehicle went back to Clark Airport and back to Balintawak. This routine was continued for 17 hours. The second car started from Clark Airport then proceeded to Mindanao Avenue, and then went back to Clark Airport. This routine was continued for 18 hours. The third car started from Balintawak and survey was for 19 hours.

Two (2) cars are allocated for MacArthur Highway, one starts from Clark Airport and other started from EDSA. This survey is also continued for 14 or 18 hours.

**Table 5.3-1 Survey route & duration**

Route	Section	Survey duration
NLEX	Clark airport to Mindanao Avenue	3 cars for 17 -19 Hours
	Clark airport to Balintawak	
MacArthur Highway	Clark airport to EDSA	2 cars for 14-18 Hours

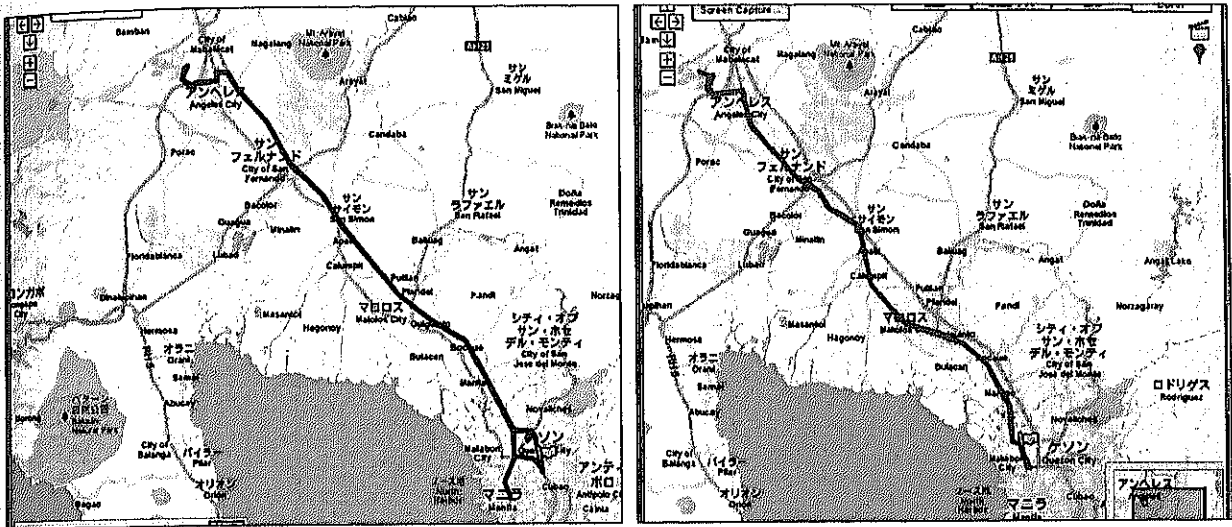


Figure 5.3-1 Survey Routes

## 5.4 Survey Result

### 5.4.1 NLEX Route

The survey result for NLEX route is shown in Table 5.4-1. The average travel speed between Clark Airport and Mindanao Ave is about 60km/h and the average travel speed between Clark Airport and Balintawak is also about 60km/h. Travel speed at each point is shown Figure 5.4-1 and 5.4-2. In most points, travel speeds are over 60km/h.

Table 5.4-1 Survey Result for NLEX Route

No.	Date	Day	Direction		Departure Time	Arrival Time	Travel Time	Distance (km)	Travel Speed (Km/hr)
			From	To					
1	10/17/12	Wednesday	Clark Airport	Mindanao Ave	06:54:08	08:18:20	01:24:12	83	59
2	10/17/12	Wednesday	Clark Airport	Mindanao Ave	08:53:47	09:53:47	01:26:12		58
3	10/17/12	Wednesday	Clark Airport	Mindanao Ave	10:46:33	12:09:01	01:22:28		60
4	10/17/12	Wednesday	Clark Airport	Mindanao Ave	14:07:18	15:30:22	01:23:04		60
5	10/17/12	Wednesday	Clark Airport	Mindanao Ave	16:16:35	17:50:57	01:34:22		53
6	10/17/12	Wednesday	Clark Airport	Mindanao Ave	18:29:10	20:14:04	01:44:54		47
7	10/17/12	Wednesday	Clark Airport	Mindanao Ave	23:38:01	00:54:59	01:16:58		65
8	10/17/12	Wednesday	Mindanao Ave	Clark Airport	08:26:30	09:52:50	01:26:20		58
9	10/17/12	Wednesday	Mindanao Ave	Clark Airport	12:00:43	13:22:20	01:21:37		61
10	10/17/12	Wednesday	Mindanao Ave	Clark Airport	12:24:20	13:42:55	01:18:35		63
11	10/17/12	Wednesday	Mindanao Ave	Clark Airport	15:57:04	17:27:10	01:30:06		55
12	10/17/12	Wednesday	Mindanao Ave	Clark Airport	21:01:37	22:22:04	01:20:27		62
13	10/17/12	Wednesday	Mindanao Ave	Clark Airport	21:02:13	22:21:25	01:19:12		63
14	10/17/12	Wednesday	Clark Airport	Balintawak	06:00:00	07:22:18	01:22:18	85	62
15	10/17/12	Wednesday	Clark Airport	Balintawak	09:33:33	10:57:48	01:24:15		61
16	10/17/12	Wednesday	Clark Airport	Balintawak	13:22:20	14:47:11	01:24:51		60
17	10/17/12	Wednesday	Clark Airport	Balintawak	13:26:40	14:52:09	01:25:29		60
18	10/17/12	Wednesday	Clark Airport	Balintawak	16:43:05	18:22:43	01:39:38		51
19	10/17/12	Wednesday	Clark Airport	Balintawak	20:54:23	22:26:24	01:32:01		55
20	10/17/12	Wednesday	Clark Airport	Balintawak	22:22:04	23:45:42	01:23:38		61
21	10/17/12	Wednesday	Balintawak	Clark Airport	07:00:30	08:27:35	01:27:05		59
22	10/17/12	Wednesday	Balintawak	Clark Airport	07:53:24	09:15:58	01:22:34		62
23	10/17/12	Wednesday	Balintawak	Clark Airport	10:57:48	12:19:32	01:21:44		62
24	10/17/12	Wednesday	Balintawak	Clark Airport	14:48:47	16:16:35	01:27:48		58
25	10/17/12	Wednesday	Balintawak	Clark Airport	15:16:37	16:41:55	01:25:18		60
26	10/17/12	Wednesday	Balintawak	Clark Airport	18:22:43	19:49:38	01:26:55		59
27	10/17/12	Wednesday	Balintawak	Clark Airport	23:45:35	01:14:00	01:28:29		58

Direction		Average Travel Time	Distance (km)	Travel Speed (Km/hr)
From	To			
EDSA	Mindanao Ave.	01:27:27	83	57
Mindanao Ave	Clark Airport	01:22:43		60
Clark Airport	Balintawak	01:27:27	85	58
Balintawak	Clark Airport	01:25:42		60

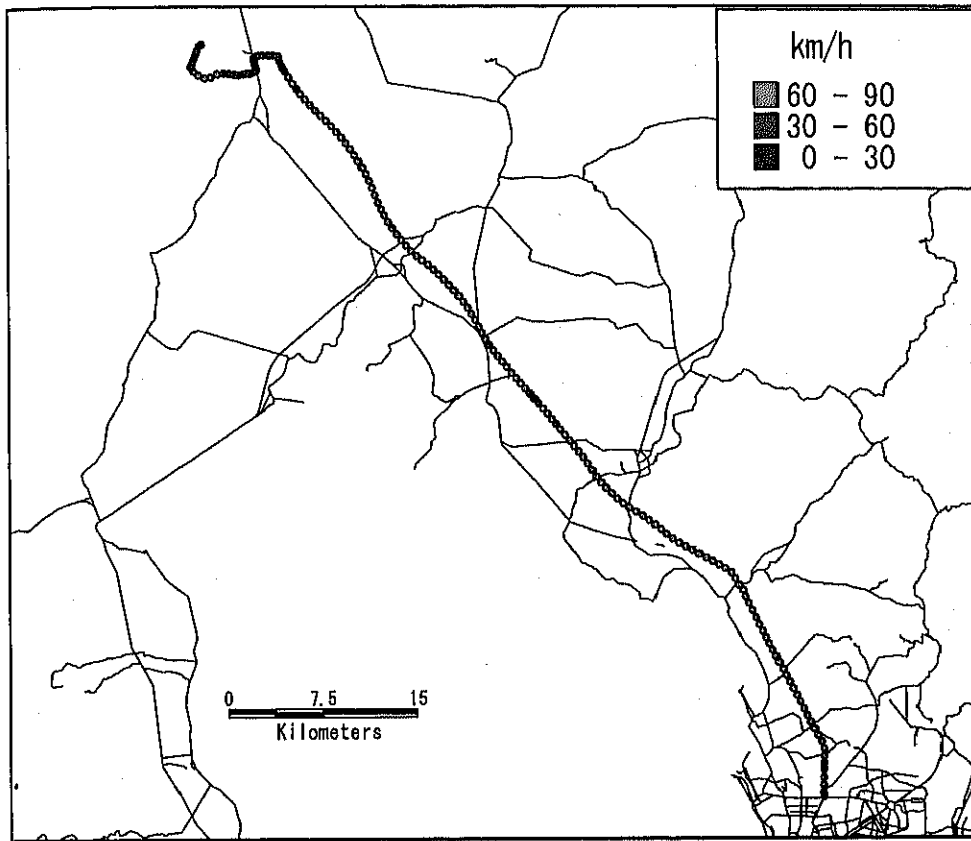


Figure 5.4-1 Travel Speed at Each Point from Balintawak to Clark Airport (7:00-8:27)

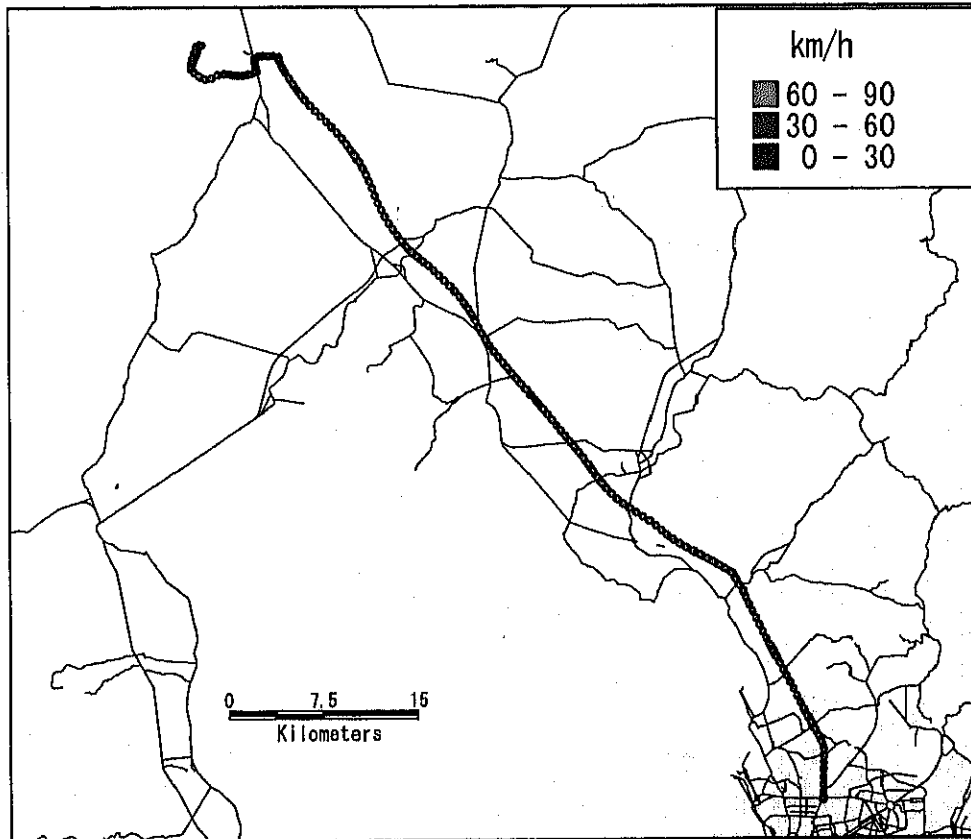


Figure 5.4-2 Travel Speed at Each Point from Clark Airport to Balintawak (6:00-7:22)

5.4.2 MacArthur Route

The survey result for MacArthur route is shown in Table 5.4-2. The average travel speed between Clark airport and EDSA is about 25km/h. Travel speed at each point is shown Figure 5.4-3 and 5.4.4. In most points travel speed are about 15-45 km/h.

Table 5.5-1 Survey Result for MacArthur Route

No.	Date	Dny	Direction		Departure (Time)	Arrival (Time)	Travel (Time)	Distance (km)	Travel Speed (Km/hr)
			From	To					
1	10/24/12	Thursday	EDSA	Clark Airport	06:18:36	09:14:24	02:55:48	86	29
2	10/24/12	Thursday	EDSA	Clark Airport	10:07:43	13:39:03	03:31:20		24
3	10/19/12	Friday	EDSA	Clark Airport	11:50:18	15:20:20	03:30:02		25
4	10/24/12	Thursday	EDSA	Clark Airport	13:52:19	17:46:23	03:54:04		22
5	10/19/12	Friday	EDSA	Clark Airport	21:42:45	00:16:54	02:34:09		33
6	10/24/12	Thursday	Clark Airport	EDSA	06:20:44	09:21:36	03:00:52		29
7	10/24/12	Thursday	Clark Airport	EDSA	10:11:12	13:25:56	03:14:44		26
8	10/19/12	Friday	Clark Airport	EDSA	16:45:54	20:33:57	3:48:03		23
9	10/25/12	Thursday	Clark Airport	EDSA	17:46:23	20:48:35	03:02:12		28

Direction		Average Travel Time	Distance (km)	Travel Speed (Km/hr)
From	To			
EDSA	Clark Airport	03:17:05	86	26
Clark Airport	EDSA	03:25:07		25

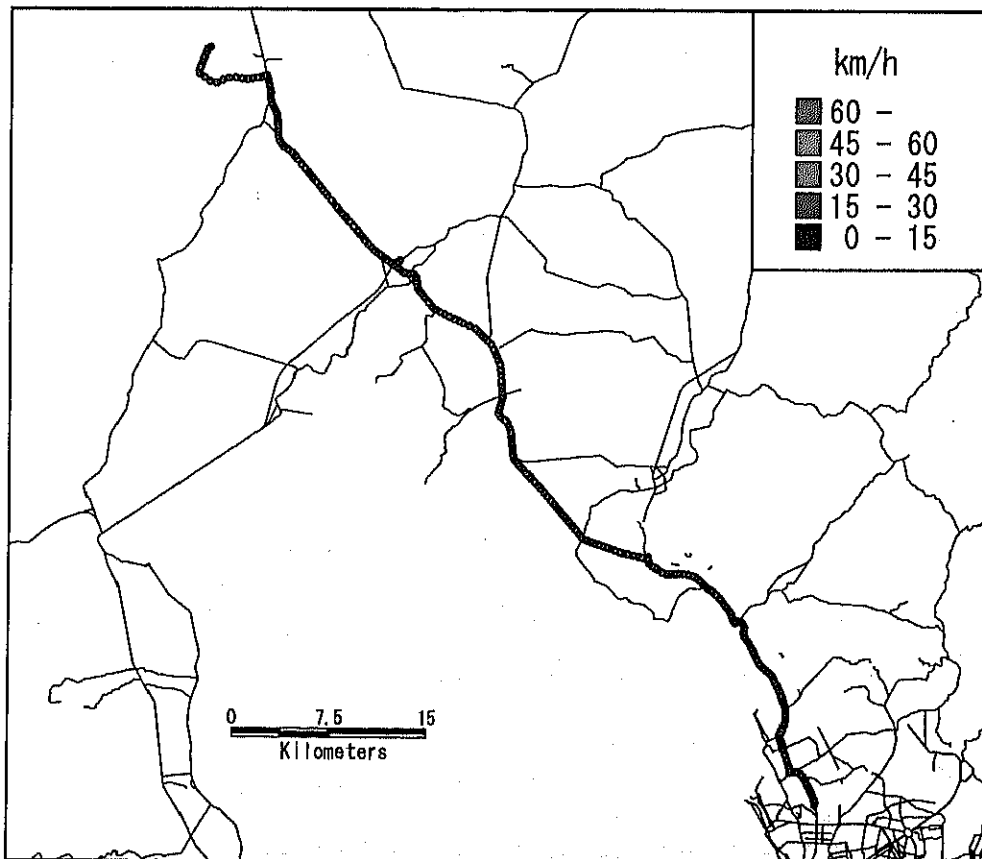


Figure 5.4-3 Travel Speed at Each Point from EDSA to Clark Airport (6:18-9:14)

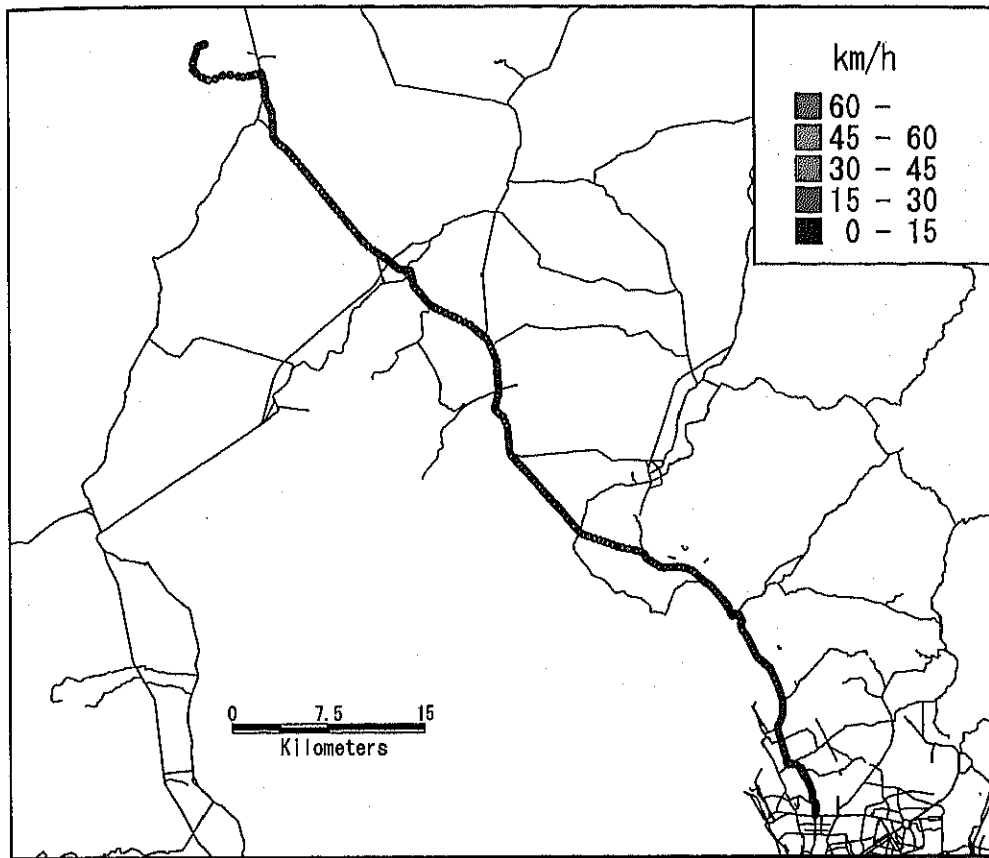


Figure 5.4-4 Travel Speed at Each Point from Clark Airport to EDSA (6:20-9:21)