

Department of Transportation and Communications (DOTC)  
Philippine National Railways (PNR)

# **Preparatory Survey on Promotion of TOD for Urban Railway in the Republic of the Philippines**

## **Final Report**

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**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

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## ABBREVIATIONS

A & D	alienable and disposable
AASHTO	American Association of States Highway and Transportation Officials
AC	asphalt concrete
ACEL	Association of Construction Equipment Lessors Inc.
ACP	asphalt concrete pavement
AGR	average growth rate
ALI	Ayala Land Inc.
ARMM	Autonomous Region in Muslim Mindanao
AT	auto transformer
BAU	business-as-usual
BIR	Bureau of Internal Revenue
BLT	built-lease-transfer
BOO	build-own-and operate
BOT	build-operate-transfer
BP	Batas Pambansa
BPO	business process outsourcing
BRLC	Bulacan, Rizal, Laguna and Cavite
BT	build-and-transfer
CALABARZON	Cavite, Laguna, Batangas, Rizal and Quezon
CAMANAVA	Caloocan-Malabon-Navotas-Valenzuela
CAR	Cordillera Autonomous Region
CBD	central business district
CBR	california bearing ratio
CER	certified emission reduction
CFL	compact fluorescent lamps
CIA	Clark International Airport
CIPR	Coliers International Philippine Research
CLUP	comprehensive land use plan
CO	carbon monoxide
COA	commission on audit
CPI	consumer price index
DMF	design and monitoring framework
DCF	discounted case flow
DOE	Department of Energy
DOF	Department of Finance
DOLE	Department of Labor and Employment
DOTC	Department of Transportation and Communications
DPWH	Department of Public Works and Highways
DR	Derivative Regulations
DSM	digital surface model
DTM	digital terrain model
EDSA	Epifanio de los Santos Avenue.
EIRR	economic internal rates of return
EMB-DENR	Environmental Management Bureau, Department of Environment and Natural Resources
ENPV	economic net present value
FAR	floor area ratio
FFCCCI	Federation of Filipino Chinese Chambers of Commerce and Industry
FIDCI	International Federation of Consulting Engineers
FIES	family income and expenditures survey
FIRR	financial internal rate of return
FNPV	financial net present value
GCR	Greater Capital Region
GDP	gross domestic product

GF	ground floor
GOTESCO	Gotesco Investments, Inc.
GRDP	gross regional domestic product
GVA	gross value added
HLURB	Housing and Land Use Regulatory Board
IC	independent consultant
ICB	international competitive bidding
ICC	Investment Coordination Committee
ISF	Informal Settlement Family
IRR	Implementing Rules and Regulations
IT	Information Technology
ITS	integrated transport System
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
JR	Japan Railway
KPI	key performance indicators
L/A	loan agreement
LEED	leadership in energy and environmental design
LED	light-emitting diodes
LGU	local government unit
LID	low impact development
LRT	Light Rail Transit
LRTA	Light Rail Transit Authority
MCCI	Manila Chamber of Commerce and Industry
MCU	Manila Central University
MIMAROPA	Mindoro, Marinduque, Romblon and Palawan
MMDA	Metro Manila Development Authority
MNTC	Manila North Tollways Corp
MOU	memorandum of understanding
MPSS	minimum performance specifications and standards
MRT	Metro Rail Transit
MRRCo	Manila Railroad Company
MXD	Mixed-use development
NAIA	Ninoy Aquino International Airport
NBCP	National Building Code of the Philippines
NCR	National Capital Region
NEDA	National Economic and Development Authority
NHCP	National Historical Commission of the Philippines
NHI	National Historical Institute
NLEx	North Luzon Expressway
NOx	nitrogen oxides
NSCB	National Statistical Coordination Board
NSCR	North South Commuter Rail
NSO	National Statics Office
NSRP	North South Railway Project
NTT	Nippon Telegraph and Telephone Corp.
O & M	operation and management
OCM	overhead, contingency and miscellaneous
O & O	off shoring and outsourcing
ODA	official development assistance
PC	prestressed concrete
PCC	portland cement concrete
PCCP	portland cement concrete pavement
PD	Presidential Decree
PDC	Provincial Development Council
PEZA	Philippine Economic Zone Authority

PHP	Philippine Pesos
PLDT	Philippine Long Distance Telephone Company
PLO	percentage of land occupancy
PM	particulate matters
PNR	Philippine National Railways
PPP	public-private partnership
PODA	Pedicab Operators and Driver's Association
PRA	Philippines Retailers Association
PRCI	Philippine Racing Club, Inc.
PRRC	Pasig River Rehabilitation Commission
PUB	public utility bus
PUJ	public utility jeepney
RA	Republic Act
RCPC	Reinforced Concrete Pipe Culvert
RIDF	rainfall intensity, duration, and frequency
ROO	Rehabilitate own operate
ROT	rehabilitate-operate-transfer
ROW	right-of-way
SCADA	supervisory control and data acquisition
SCTEX	Subic-Clark-Tarlac Expressway
SLEx	South Luzon Expressway
SMDC	SM Development Corporation
SME	small and medium enterprise
STI	Systems Technology Institute
SWOT	strengths, weaknesses, opportunities and threads
TESDA	Technical Education and Skills Development Authority
TPLEX	Tarlac-Pangasinan-La Union Expressway
TPI	Tutuban Properties Inc
TOD	transit oriented development
TODA	Tricycle Operators and Driver's Association
TOR	term of reference
TRL	Transport Research Laboratory
TTF	Tourism and Transport Forum
UAV	unmanned aerial vehicle
UE	University of East
USVDAI	United Sidewalk Vendors of Divisoria Association, Inc.
VAT	value added tax
VOC	volatile organic compounds
WWR	wall to window
ZV	zonal value

## **EXECUTIVE SUMMARY**

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## 1. INTRODUCTION

1.1 The population of Metro Manila in the Philippines increased dramatically due to rapid urbanization. Metro Manila generates 37% of the country's gross domestic product (GDP) as the nation's largest economic center. Even though the transportation network in the metropolis has gradually improved, the serious problem of traffic congestion has not been solved yet. Such congestion results in significant economic losses and constraints to environmental sustainability.

1.2 In order to solve the traffic congestion, it is essential to develop a mass transit system in the north-south direction as a core infrastructure axis to cover the expanding commuter demand. Currently, the Philippine National Railways (PNR) operates the commuter line in the southern part of Metro Manila, between Manila City and Calamba City in Laguna Province. Meanwhile, railway operation has not been started in the northern part of Metro Manila. Residential areas between Caloocan and Malolos have been expanded without sufficient modes of public transportation. Therefore, the development of a mass transit system in this section is urgently required.

1.3 In response to the conditions previously described, the Japan International Cooperation Agency (JICA) is currently implementing various cooperation projects associated with the commuter rail between the suburbs and Metro Manila. In order to enhance the outcomes of the North South Commuter Rail (NSCR) project, the Preparatory Survey on Promotion of Transit-Oriented Development (TOD) for Urban Railway in the Republic of the Philippines (hereafter "the Study") was conducted. The Study aims to promote a modal shift to public transportation and integrated development along the NSCR railway through the improvement of transport access, development for the improvement on the socioeconomic and environmental aspects that will lead to sustainable urban development. These objectives are expected to be attained through the preparation of the following study outputs:

- (i) Concept plan indicating the general guidelines to implement TOD for all 10 stations in the section of Phases 1 and 2-A of the NSCR project;
- (ii) Transportation access improvement plan for Caloocan, Solis and Tutuban Stations; and
- (iii) Concept design for Tutuban area redevelopment including detailed access improvement plan and integrated development plan, and assistance in project implementation planning.

1.4 Since TOD involves various issues in terms of socioeconomic and environmental aspects, a number of meetings were held with major stakeholders including both public and private sectors to share information as well as to foster cooperative and supportive relationship.

1.5 The counterpart agencies of the Study are the Department of Transportation and Communications (DOTC) and the PNR. Figure 1.1 shows the study area of the NSCR project and the Study, as well as a summary of the NSCR project.



Source: JICA Study Team.

- 1. Project Name**  
North-South Commuter Rail (NSCR) Project
- 2. Project Objectives**  
The project aims to expand the commuter rail in Metro Manila by the development of the north section between Malolos and Tutuban. Consequently, the project contributes to mitigating the serious traffic congestion and air pollution in Metro Manila.
- 3. Project Area**
  - (1) Phase 1: Malolos-Caloocan (approx. 31.3 km)
  - (2) Phase 2-A: Caloocan-Tutuban (approx. 5.0 km)
- 4. Stakeholders**  
DOTC, PNR
- 5. Japanese ODA Projects Related to the NSCR**
  - (1) Capacity Enhancement of Mass Transit Systems in Metro Manila Project (Loan Agreement (L/A): March 2013, ODA Loan)
  - (2) Preparatory Survey on Airport Express Railway Project (Commuter Line Section) (May 2013-November 2014)
  - (3) Preparatory Survey on Metro Manila Central Business Districts Transit System Project in the Republic of the Philippines (October 2013-May 2015)

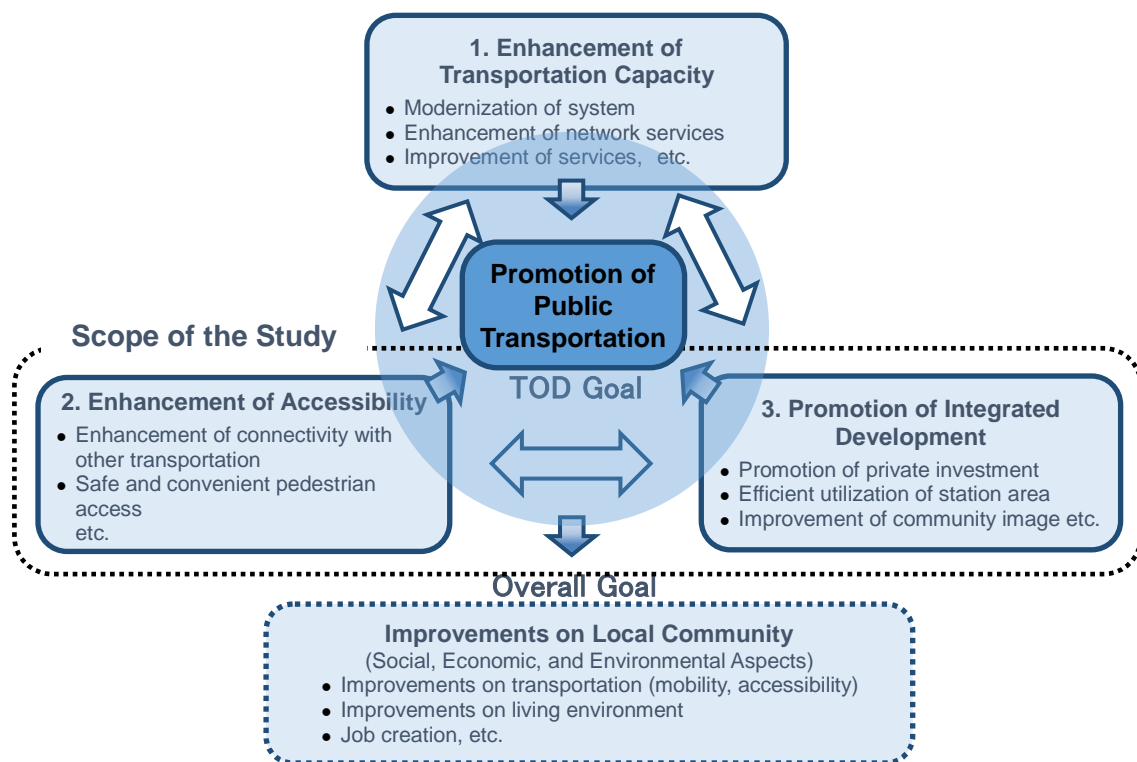
**Figure 1.1 NSCR and TOD Study Area, and Summary of the NSCR Project**

## 2. CONCEPT OF TOD AND INTEGRATED DEVELOPMENT

### 1) Concept and Objectives of TOD

2.1 TOD is a development approach that promotes public transportation with the multiplier effects through the integration of transportation development and other types of development such as commercial, office, and residential development in the vicinity of mass transit stations.

2.2 As Figure 2.1 shows, the enhancement of transportation capacity and accessibility as well as the promotion of integrated development are essential to implement successful TOD that contributes to promotion of public transportation. In order to maximize the benefits and positive impacts of the NSCR, the Study explored the opportunity for enhancement of accessibility and integrated development by TOD.



Source: JICA Study Team.

**Figure 2.1 Concept of TOD**

### 2) Approach to Implementation of TOD for NSCR

2.3 Since TOD encompasses a variety of stakeholders from community level to national level, coordination with the relevant stakeholders at the right moment becomes important for the implementation of TOD.

2.4 Implementation schedule also needs to be considered as all improvements cannot be implemented simultaneously. However, certain accessibility needs to be improved prior to the railway operation to maximize its benefits.

2.5 In order to formulate a practical and good plan of TOD, the impact of TOD should be analyzed based on the spatial characteristics. In the Study, three areas are delineated according to the distance from the station, namely (i) Station area within 200 m from the station, (ii) Walkable area within approximately 1 km from the station and (iii) Transit



supportive area within approximately 3-5 km from the station.

2.6 By taking relevant stakeholders, implementation schedule, and spatial characteristics into consideration, following major components of TOD are studied.

- (1) **Access Improvement:** A basic TOD principle is to provide a safe, convenient and comfort pedestrian access within a walkable area from the station. Therefore, walkable area is closely analyzed in the Study. The walkable area includes significant potential to maximize the benefits of the NSCR by both access improvement and integrated development. Universal access for all passengers including elderly people and persons with disabilities or special needs have to be considered and integrated in the design. Feeder public transportation services such as buses and jeepneys improve the convenience for the passengers and expands the transit supportive area. To implement access improvement, coordination with the relevant public sector such as the Department of Public Works and Highways (DPWH) and Local Government Units (LGUs) as well as local community will be required.
- (2) **Promotion of Integrated Development:** In order to formulate a practical TOD plan, implementation scheme also needs to be considered based on the current PPP scheme. Therefore, relevant stakeholders as well as necessary implementation scheme and consulting services are identified to implement TOD as described in Chapter 5. Land acquisition is a key to succeed the integrated development along the railway corridor and timely coordination with LGUs is necessary to acquire sufficient land for integrated development such as new township development and public transportation facilities.
- (3) **Enhancement of Management System for Access Improvement :** Access improvement cannot be implemented solely through the physical improvements such as road widening. Traffic management is also required to control transportation in a safe, convenient and sustainable manner. In Metro Manila, control of on-street parking and street vendors is necessary to mitigate congestion. To enhance traffic management, coordination among the relevant government agencies such as the DPWH, Metro Manila Development Authority (MMDA), LGUs and local communities such as the barangays will be needed.

### 3) Good Practices of TOD

2.7 Japan has a long history of railway transportation and many successful TOD cases for access improvement and integrated development along the railway corridor. Through PPP schemes, experience and resources in the private sector have been utilized to implement the integrated development including the development of public transportation facilities. In Japan, land readjustment projects have been adopted to develop and manage the public transportation facilities. Land readjustment projects also promotes the intensification of land use by the construction of the multi-layer facilities such as a pedestrian deck and multistory parking. Regarding the land intensification, Japanese good practices of utilization the space under the viaduct for commercial and public facilities including public transportation facilities also can be referred to the integrated development along the NSCR.

### 3. CONCEPT PLAN

#### 1) Malolos Station

3.1 **Characteristics:** Malolos is the capital of Bulacan Province and Malolos Station is located south side of the Bulacan Capitol Complex. The Malolos station area serves as a center of politics, education and culture in the province. The major facilities within 1km radius from the station are the Bulacan Provincial Capitol Complex, Malolos City Hall, Bulacan State University, and the Barasoain Church which is a famous tourist attraction in the province (see Figure 3.1). There are large, contiguous vacant lots suitable for mixed-use subdivision or township development. The largest one is 52 hectare.

3.2 MacArthur Highway which runs parallel to the NSCR serves locally as well as regionally by connecting to the Ilocos Region in North Luzon. The existing road network surrounding the station was established based on the developments initiated by the different landowners and developers without any consistency. Besides the unorganized road network, traffic management is also lacking and deteriorates the traffic congestion on MacArthur Highway.

3.3 **Issues:** Limited access between the major facilities and across the arterial cause congestion as well as increase of risk for the pedestrian. Vulnerability to the flood also increases due to the number of residential development without appropriate storm water detention/retention facilities.

3.4 **Concept Plan:** The TOD concept at the Malolos Station area is to leverage the NSCR and TOD to enhance the role of Bulacan's capital as a competitive social and multi-cultural city. Promotion of mid- to high-density mixed use, reorganization of urban spatial structure by the designation of green reserve, and establishment of road network by connecting the missing link are encouraged (see Figure 3.1).

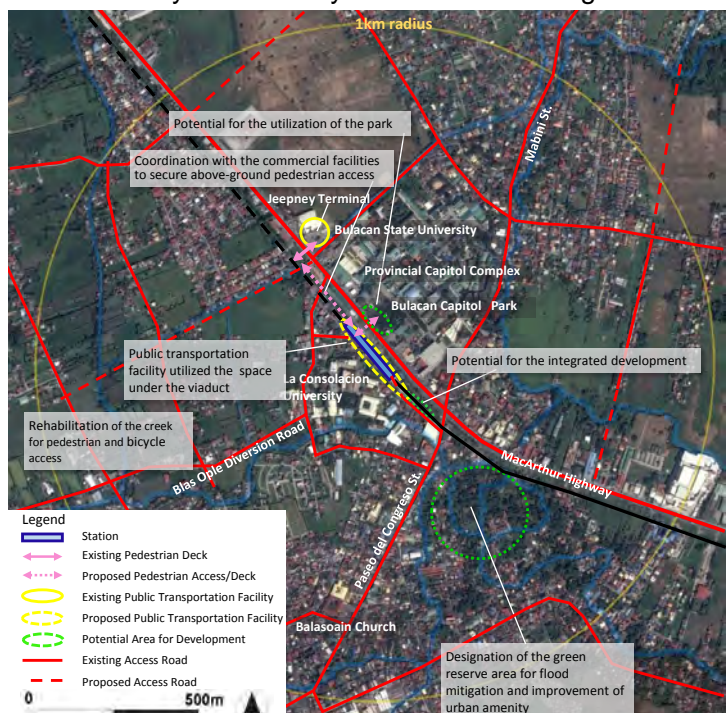


Figure 3.1 Concept Plan of Malolos Station Area

Table 3.1 Major Projects for Malolos Station

Project	Term
1 Public transportation facility under the viaduct	Short-term
2 Public transportation facility in Bulacan Capitol Park	Short-term
3 Access roads / pedestrian deck to the station within 200m from the station	Mid-term
4 Access roads within 1 km radius from the station	Mid-term
5 Mixed-use facilities within 200 m from the station	Mid-term
6 Green reserve with retention facility	Mid- to Long-term
7 Rehabilitation of the creeks with pedestrian walkway and bicycle lane	Mid- to Long-term

Source: JICA Study Team.

\* Short-Term: by 2020, Mid-term: by 2020–2030, Mid- to Long- term: by 2030-2040

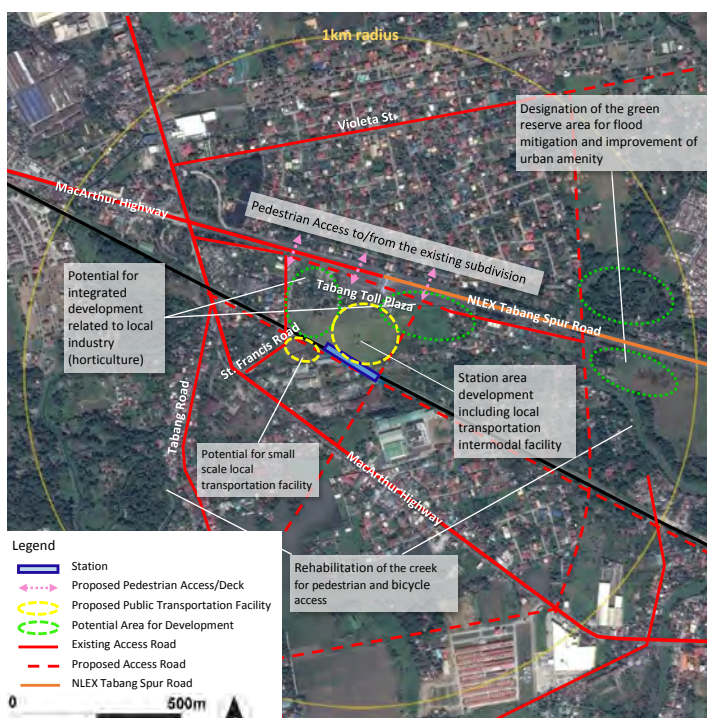
## 2) Guiguinto Station

**3.5 Characteristics:** Guiguinto Station is located on the southwestern part of the Municipality of Guiguinto in Bulacan. The station is located between the North Luzon Expressway (NLEX) Tabang Spur Road and MacArthur Highway (see Figure 3.2). Several subdivisions exist north of the NLEX Tabang Spur Road and south of MacArthur Highway. Although the Guiguinto Municipal Hall is located in the center of Guiguinto, it is relatively far (approximately 1.5 km) from the station. The area is famous for its flowers/ornamental plants and many garden shops and nurseries are located along the NLEX Tabang Spur Road from the Guiguinto Interchange and become a major industry in the neighborhood.

**3.6** The major land use in the area is agriculture and residential, followed by industrial and commercial land use along MacArthur Highway. In addition to the existing large farms and residential areas, certain vacant lots with the size of up to 36 hectare are located in the vicinity of the station. Therefore, the station area has a high potential for integrated development including public transportation facilities.

**3.5 Issues:** In addition to the fact that local community is divided by NLEX Tabang Spur Road and MacArthur Highway, internal access within the divided areas and/or between the areas is also limited. While some areas are developed for subdivisions, informal settlement families (ISFs) are occupying the agricultural area around the station.

**3.7 Concept Plan:** The TOD concept plan for the Guiguinto Station area is to facilitate the development to become a new sub-center of Bulacan. Promotion of local industry (horticulture) has to be integrated in the plan. Green reserve needs to be designated in the area vulnerable to the flooding in order to mitigate the flood risk and increase urban amenities (see Table 3.2). The intermodal facility from the train to the feeder transportation should be developed in the large vacant area adjacent to the station. The vacant lots nearby the station can be also utilized for mixed-use facilities development. To improve access to the station as well as between the local communities, several pedestrian bridges connecting the NLEX Tabang Spur Road and MacArthur Highway are proposed.



Source: JICA Study Team.

**Figure 3.2 Concept Plan of Guiguinto Station Area**

**Table 3.2 Major Projects in Guiguinto Station Area**

	Project	Term
1	Public transportation facilities	Short-term
2	Access roads to the station (direct access)	Short-term
3	Access roads within 1 km from the station	Mid-term
4	Mixed-use facilities within 200 m from the station	Mid-term
5	Mixed-use facilities within 1 km from the station	Mid- to Long-term
6	Green reserve with retention facility	Mid- to Long-term
7	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	Mid- to Long-term

Source: JICA Study Team.

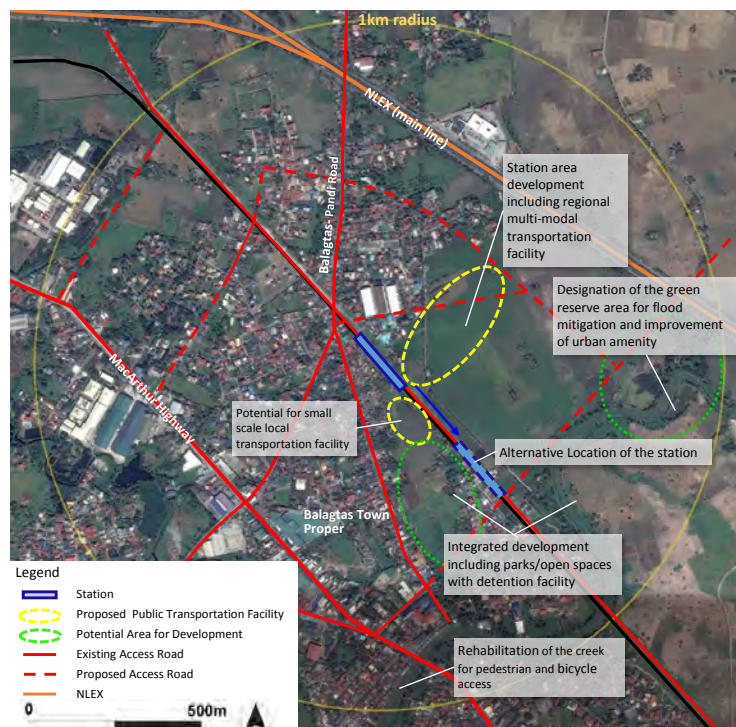
\*Short-term: by 2020, Mid-term: by 2020–2030, Mid- to Long- term: by 2030-2040

### 3) Balagtas Station

**3.8 Characteristics:** Balagtas Station is located near the center of the Municipality of Balagtas between NLEX main line and MacArthur Highway which runs parallel to the NSCR (see Figure 3.3). Since the original station is still existing in good condition, further study for its preservation is recommended. The major land use within 1 km radius from the station is residential and agricultural. Commercial and educational facilities are concentrated along MacArthur Highway. Several residential areas are identified along barangay roads in the vicinity of the station.

**3.9 Issues:** Due to the limited access connecting NLEX and MacArthur Highway, traffic is concentrated along MacArthur Highway and causing serious traffic congestion which becomes a major issue for the local residents. Lands have been developed in unorganized manner with plenty of room for improvements in terms of efficiency and effectiveness.

**3.10 Concept Plan:** The TOD concept for the Balagtas Station area is to develop a regional transportation hub with the multimodal facilities. Since currently proposed station is located in the middle of the existing residential area where new access improvement projects such as road widening and new road construction are difficult to implement due to the limited availability, it is recommended to locate the station to approximately 400 m to the southeast adjacent to the large vacant lot. This relocation enables to implement the integrated development including the regional multi-modal transportation facility. The large vacant lot adjacent to the alternative location of the station also provides the space to develop a direct access to the station from MacArthur Highway (see Figure 3.3). As the Balagtas Station area is also flood-prone similar to Malolos and Guiguinto Station areas certain space along the creek needs to be preserved to mitigate the flood risk and enhance the urban amenity.



Source: JICA Study Team.

**Figure 3.3 Concept Plan of Balagtas Station Area**

**Table 3.3 Major Projects in Balagtas Station Area**

	Project	Term*
1	Public transportation facilities	Short-term
2	Access roads to the station (direct access)	Short-term
3	Access roads within 1 km from the station	Mid-term
4	Mixed-use facilities within 200 m from the station	Mid-term
5	Mixed-use facilities within 1 km from the station	Mid- to Long-term
6	Green reserve with retention facility	Mid- to Long-term

Source: JICA Study Team.

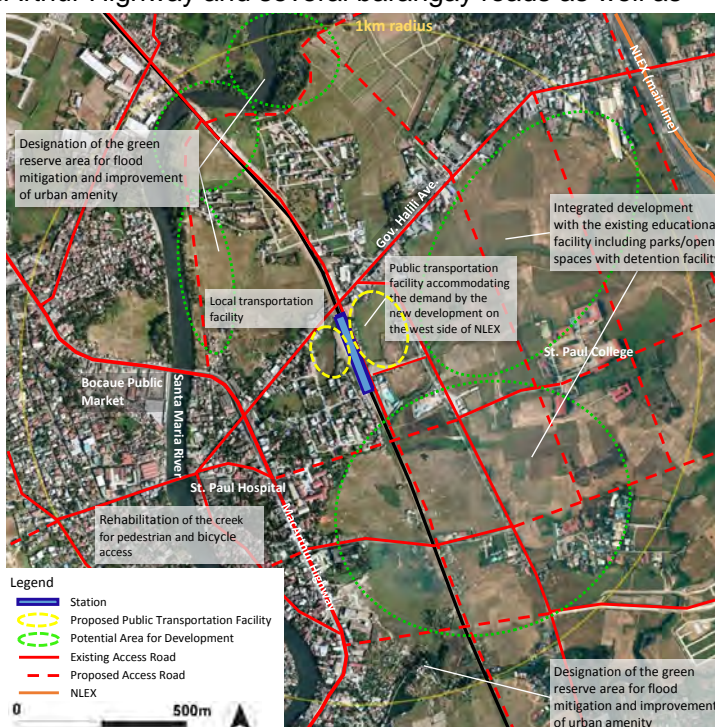
\*Short-term: by 2020, Mid-term: by 2020–2030, Mid- to Long- term: by 2030-2040

#### 4) Bocaue Station

**3.11 Characteristics:** Bocaue Station is located near the center of the Municipality of Bocaue. The major facilities within 1 km radius from the station are St. Paul Hospital, St. Paul College, and Bocaue Public Market (see Figure 3.4). In spite of the distance of approximately 2.5 km from the station, the Philippine Arena, which is regarded as the largest arena in the world has potential to provide the impact on the station area. There are large vacant agricultural lots around the station, which can be possibly utilized for the integrated development. Part of the vacant lots are settled by ISFs. Major land use in the vicinity of the station is residential on the west side and agricultural on the east side.

**3.12 Issues:** Bocaue is the station area includes one of the largest vacant lots that can be utilized for the integrated development. Despite the high potential for development, the existing road network in the area is not well established yet. Since the station area is surrounded by the inundated area, the drainage system needs to be improved by the integrated development. Gov. F. Halili St., which is supposed to be the direct access road to the station, provides access to MacArthur Highway and several barangay roads as well as subdivision roads. However, the width of the road is insufficient as a service road to MacArthur Highway and cause traffic congestion at the junction.

**3.13 Concept Plan:** The TOD concept for the Bocaue Station area is to establish a municipal center with a highly convenient transportation system by the efficient and effective land use for the available vacant lots in the vicinity of the station. In order to establish the appropriate road network, construction of new roads, including a bridge crossing the Sta. Maria River and extension of the existing roads are proposed (see Table 3.4). Preservation of the existing woods and grasslands along the creek, upgrading the existing drainage facilities, development of the mixed-use commercial and residential facilities, and the development including the integration with the existing educational institutions such as St. Paul College are also proposed.



Source: JICA Study Team.

**Figure 3.4 Concept Plan of Bocaue Station Area**

**Table 3.4 Major Projects in Bocaue Station Area**

	Project	Term*
1	Public transportation facilities	Short-term
2	Access roads to the station (direct access)	Short-term
3	Access roads within 1 km from the station	Mid-term
4	Mixed-use facilities within 200 m from the station	Mid-term
5	Mixed-use facilities within 1 km from the station	Mid- to Long-term
6	Green reserve with retention facility	Mid- to Long-term

Source: JICA Study Team.

\*Short-term: by 2020, Mid-term: by 2020–2030, Mid- to Long- term: by 2030-2040

## 5) Marilao Station

**3.14 Characteristics:** Marilao Station is located on the southwestern part of the Municipality of Marilao. The station is adjacent to SM Marilao, a large-scale shopping mall, and close to the Marilao Municipal Hall and Marilao Public Market approximately 650 m away (see Figure 3.5). The station area is the economic center of Marilao. SM Marilao installed the transport facilities such as jeepney bays and tricycle terminal for its customers. Small retail shops and low-rise residential housing located along MacArthur Highway create a vibrant atmosphere in the area.

**3.15 Issues:** The area is flood-prone, with water level reaching more than 1.5 m during the floods. However, no effective countermeasures against flooding have been taken. A lot of houses located along the Marilao River with insufficient height of river embankment. The lack of bridges causes limited access across the river.

**3.16 Concept Plan:** The TOD concept for the Marilao Station area is to be a catalyst to enhance its commercial and business functions. With the NSCR project, enhancement of the commercial activities around the station is expected to establish a central commercial area in Bulacan. It is essential to cooperate with SM Marilao, which is the major inducer of the commercial activity. The mall owner/operator should be involved in developing the transportation facility including the pedestrian deck to connect the station, SM Marilao and the integrated mixed-use development in the current vacant lots adjacent to the station area (see Table 3.5). Several bridges crossing the Marilao River are proposed to enhance east-west connection. To improve mobility of the east side area of MacArthur Highway, development of the new access road running parallel to the Highway is recommended.



Source: JICA Study Team.

**Figure 3.5 Concept Plan of Marilao Station Area**

**Table 3.5 Major Projects in Marilao Station Area**

	Project	Term*
1	Public transportation facility	Short-term
2	Access roads within 1 km from the station	Mid-term
3	Mixed-use facilities within 200 m from the station	Mid-term
4	Mixed-use facilities within 1 km from the station	Mid- to Long-term
5	Green reserve with retention facility	Mid- to Long-term
6	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	Mid- to Long-term

Source: JICA Study Team.

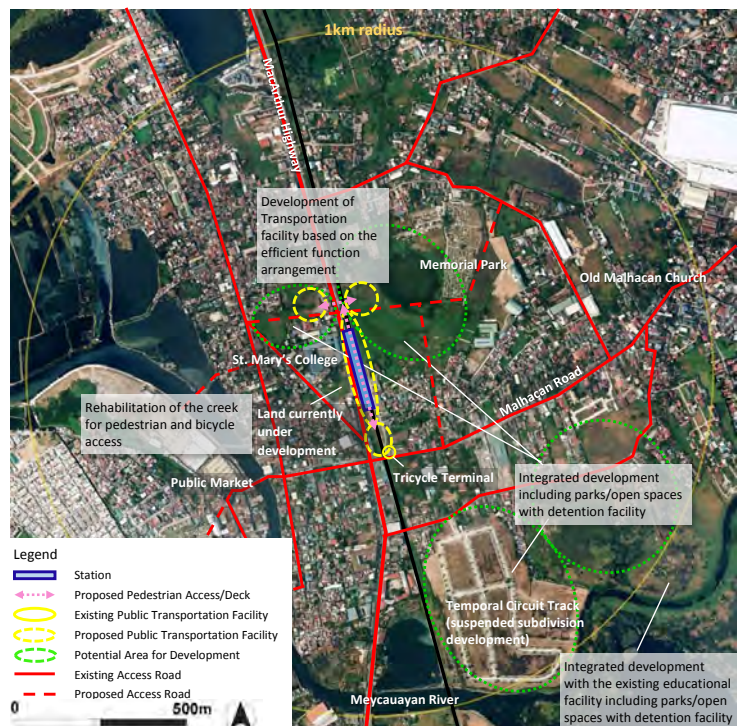
\*Short-term: by 2020, Mid-term: by 2020–2030, Mid- to Long- term: by 2030–2040

## 6) Meycauayan Station

**3.17 Characteristics:** Meycauayan Station is located southwest of Meycauayan City. The station is close to Marilao Station, approximately 1.8 km away. The old station building is still existing, but it needs to be restored. The station is located along MacArthur Highway, at the north side of the intersection with Malhacan Road which runs in east-west direction and secures the access to the station. The station area is used for residential, industrial and agricultural purposes. Its distinct characteristic is the presence of many fishponds. While many shops and factories of jewelry, shoes and leather products are concentrated in the area, there are still vacant lots which can be utilized for development (see Figure 3.6).

**3.18 Issues:** Similar to Marilao Station, the Meycauayan Station area is flood-prone. Majority of the residential and commercial lands are in the inundated areas with frequent floods except for the roads in the west side residential and commercial area constructed at the sufficient elevation. The population of Meycauayan City has increased rapidly in the past decade, and it promotes residential development without sufficient countermeasures against the flood. Development based on appropriate regional planning should be implemented immediately.

**3.19 Concept Plan:** The TOD concept plan for the Meycauayan Station area is to develop it as a competitive commercial center and to reconstruct the public transportation facilities. The proposed projects include the development of a feeder transport facility at the north and south side of the station. Since there is no access road crossing the east-west direction on the north side of the station (see Figure 3.6), new access road is proposed next to the station. In addition, bridges crossing the Meycauayan River are proposed to improve the accessibility. Since the majority of the area along the Meycauayan River has been developed, existing woods and grassland along the river need to be preserved for improvement on flood management and urban amenity.



**Figure 3.6 Concept Plan of Meycauayan Station Area**

**Table 3.6 Major Projects in Meycauayan Station Area**

	Project	Term*
1	Public transportation facility	Short-term
2	Access roads within 1 km from the station	Mid-term
3	Mixed-use facilities within 200 m from the station	Mid-term
4	Mixed-use facilities within 1 km from the station	Mid- to Long-term
5	Green reserve with retention facility	Mid- to Long-term
6	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	Mid- to Long-term

Source: JICA Study Team.

\*Short-term: by 2020, Mid-term: by 2020–2030, Mid- to Long-term: by 2030–2040

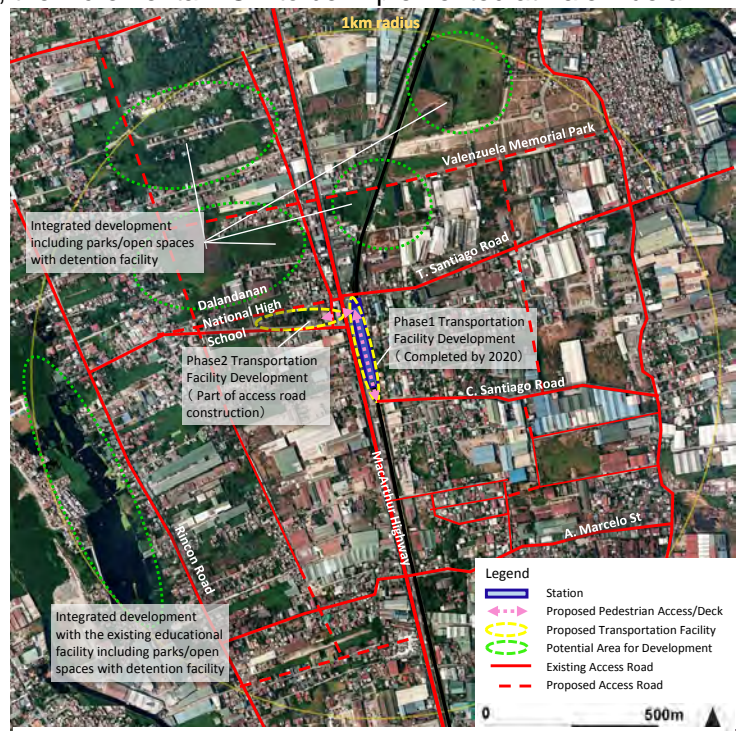
## 7) Valenzuela Station

**3.20 Characteristics:** Valenzuela Station is located on the northwest of Valenzuela City in Metro Manila. The land around the station is mainly used for residential and industrial purposes. The major facilities within 1 km from the station are the Valenzuela Memorial Park and Dalandanan National High School (see Figure 3.7). The station area is a center for religion and education. The station is located along MacArthur Highway between T. Santiago Road and C. Santiago Road which serve as east-west axis. Since Valenzuela City is a part of Metro Manila, its population density is higher than that of other station areas in Bulacan Province.

**3.21 Issues:** Due to the shortage of access roads including the pedestrian bridges crossing MacArthur Highway, the area is divided into two areas by the highway, with insufficient capacity to accommodate increased vehicle and passenger traffic. Although it is a flood-prone area in low elevation of 2 m above sea level, countermeasures for flooding is insufficient at present.

**3.22 Concept Plan:** Since there are limited vacant lots which can be used for the integrated development in the area, the incremental TOD to be implemented at Valenzuela Station is important.

The TOD concept for this area is to facilitate the gradual transformation of the communities for a more transit-oriented land use. The first step is to establish the road network for the improvements of access (see Figure 3.7). Improvements include the development of the new east-west axis road crossing MacArthur Highway and extension of the roads to connect with MacArthur Highway. Second step is to promote the integrated development along new access roads including public transportation facilities and mixed-use development. Development of the parks improves the amenities of the area as well as mitigates flooding by the installation of storm water detention/retention facilities such as a pond. Green reserve areas also need to be designated as a countermeasure for flooding and uncontrolled urbanization.



Source: JICA Study Team.

**Figure 3.7 Concept Plan of Valenzuela Station Area**

**Table 3.7 Major Projects in Valenzuela Station Area**

	Project	Term*
1	Public transportation facility (Phase 1)	Short-term
2	Public transportation facility (Phase 2)	Mid-term
3	Access roads within 1 km from the station	Mid-term
4	Mixed-use facilities within 1 km from the station	Mid- to Long-term
5	Green reserve with retention facility	Mid- to Long-term

Source: JICA Study Team.

\* Short-term: by 2020, Mid-term: by 2020–2030, Mid- to Long- term: by 2030-2040



## 8) Caloocan Station

### (1) Concept Plan

**3.23 Characteristics:** The Caloocan Station area is located at the central part of South Caloocan. The major facilities within 1 km from the station are the Caloocan City Hall, Caloocan Police Station, Caloocan Central Post Office, University of the East (UE) Caloocan, several other educational facilities, and public markets. The area is the center of political, educational and commercial activities in the city (see Figure 3.8).

**3.24** Currently, part of the PNR Caloocan property is leased by SM Development Corporation (SMDC), which will further develop the area. As most of the leased area is occupied by ISFs, SMDC is in charge of their resettlement. Segment 10, a part of NLEX-SLEX Connector Road, is planned to cross the PNR Caloocan property in parallel with the NSCR by the elevated structure.

**3.25 Issues :** While major political, educational and commercial facilities are concentrated in the Caloocan station area, access roads connecting these facilities are inadequate. One reason is the narrow width of major roads. For instance, Samson Road is the major road (national road) supposed to secure the minimum width of 20m, but its width is only 16 m including carriageway, median and sidewalks. Another issue is the existence of ISFs who are occupying not only in the SMDC's leased area but also in the other areas of Caloocan PNR property.



**Figure 3.8 Concept Plan of Caloocan Station Area**

**3.26 Concept Plan:** The TOD concept for the Caloocan Station area is to enhance its transport function as a new transportation hub in the northwest area of Metro Manila. Due to the significant roles of Caloocan as a political, commercial and business center, demand for the access improvement is high. By taking advantage of the NSCR project, implementation of TOD such as the development of the public transportation facilities and establishment of the appropriate road network will meet such demand. Proposed TOD projects include access improvement in coordination with the Segment 10 project, development of public transportation facilities, redevelopment project combined with development of green/open space and new access road connecting the existing major roads (see Table 3.8).

**Table 3.8 Profile of Major Projects for Caloocan Station**

	Project	Term*	Specification (sq.m)	Cost (PHP 000)
1	Road widening of Samson Road	Short-term	5,200 (W=20 m, L=260 m)	7,940
2	Road widening of T. Bugallon St.	Short-term	9,120 (W=12 m, L=760 m)	12,650
3	Road widening of New Abbey Road	Short-term	13,000 (W=20 m, L=650 m)	18,730
4	Development of public transport terminal	Short-term	About 1.0 hectare	33,870
5	Development of pedestrian decks	Short-term	750 (W=3 m, L=250 m)	45,000
6	Road widening of Baltazar St.	Medium-term	2,800 (W=20 m, L=140 m)	4,030
7	Installation of traffic signals	Medium-term	11 intersections	22,000
8	Development of new access road under NSCR viaduct	Medium-term	24,000 (W=12 m, L=2,000 m)	158,660
9	Development of other new access road within 1 km radius from the station	Medium to Long-term	24,400 (W=12 m, L=1,700 m)	134,860
10	Road widening of BalongBato St.	Medium to Long-term	2,700 (W=10m, L=270m)	4,460

Source: JICA Study Team.

\*Short-term: by 2020, Mid-term: by 2020–2030, Mid- to Long- term: by 2030-2040

## (2) Access Improvement Plan

**3.27** Considering the transport issues and characteristics of the urban areas in Metro Manila, following aspects are highlighted as the major elements of the access improvement plan:

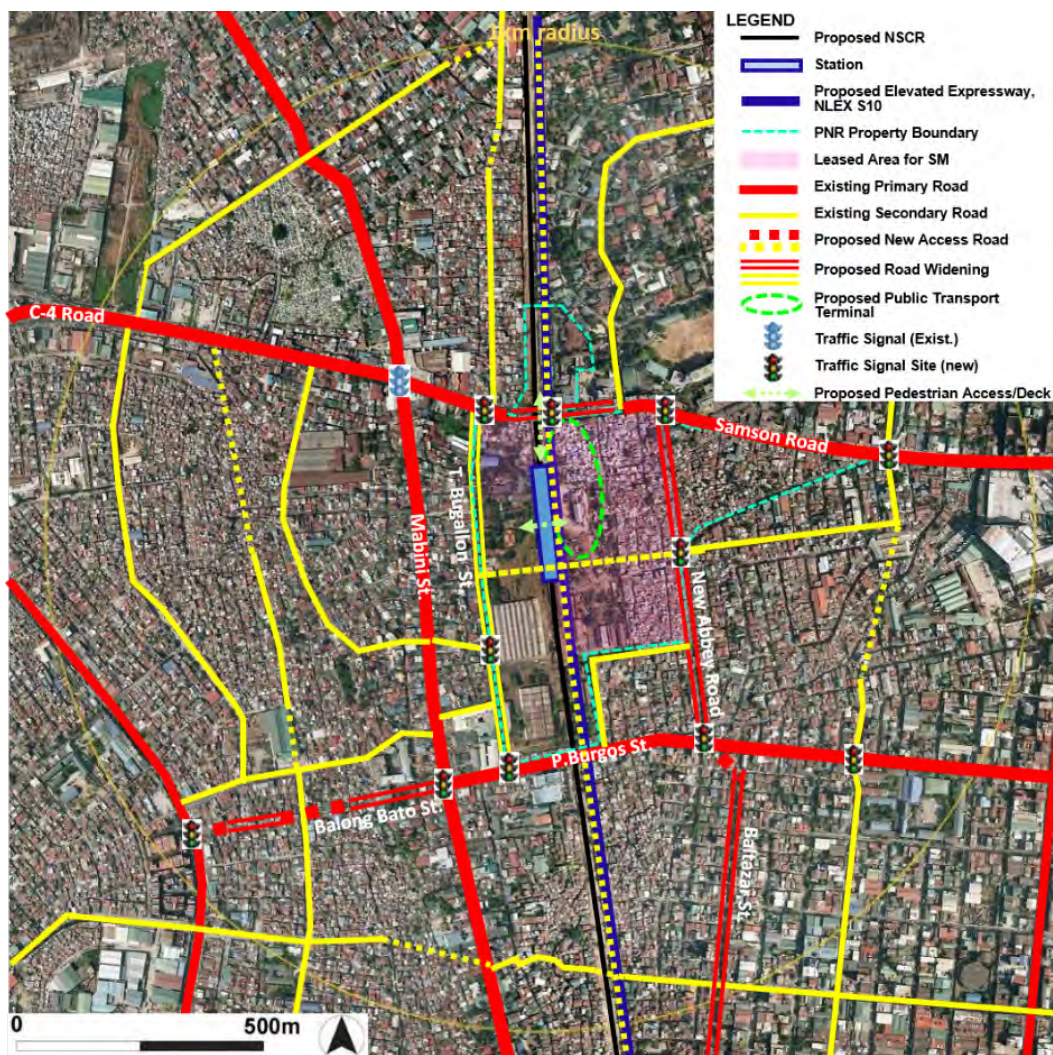
- Road capacity upgrading and enhancement;
- Development of public transportation facility;
- Intersection capacity enhancement;
- Traffic control and management;
- Sidewalk clearing and improvement;
- Traffic information dissemination campaign; and
- Installation of digital screen and monitoring boards.

**3.28** The access improvement plan is formulated based on the concept plan and traffic inventory survey to make a concrete plan for the implementation of abovementioned aspects. In addition to the road widening, construction of new access roads is proposed to enhance the road network in east-west and north-south direction. The space under the viaduct is proposed to be utilized for the new access road serving as a north-south axis. Considering the current traffic condition along Samson Road, a pedestrian bridge is also proposed to secure safe and convenient access for the pedestrians.

**3.29** It is estimated that approximately 150,000 daily passengers will use this station once the NSCR starts its operation in 2020. Therefore, at least one hectare of public

transport terminal is required to accommodate the jeepney, bus and taxi loading/unloading area as well as drop off area. Since Caloocan Station is proposed adjacent to the SM leased property, integration of the public transportation facility with the facility to be developed by SMDC as an entire package of station plaza development. While SMDC bear the construction cost of the station plaza including the public transportation facility, direct access between the station and the commercial facility to be developed by SMDC will be secured. Since significant benefit by the direct access to/from the station can be expected considering the numbers of the prospective passengers, such cost sharing is feasible and recommended. Since the station plaza and public transportation facility need to be completed by the NSCR operation in 2020, coordination with SMDC at the earliest opportunity is encouraged.

3.30 In addition to the development of public transportation facilities and road improvements, intersection capacity enhancement by installing traffic signals, traffic control and management such as regulation of on-street parking are equally important for the access improvement. Among these measures, important ones are listed as the major projects as shown in Table 3.8 and Figure 3.9.



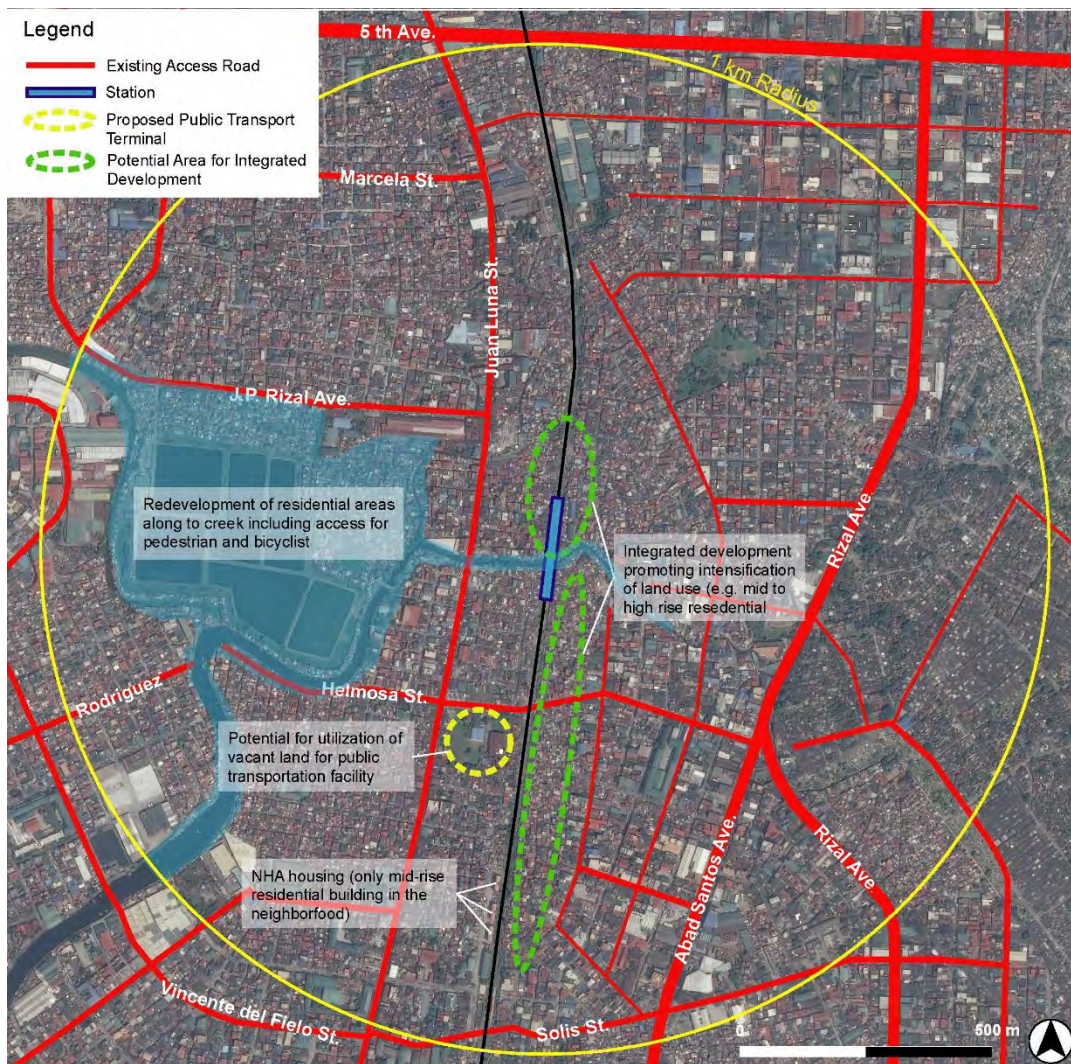
**Figure 3.9** Transport Access Improvement Plan of Caloocan Station Area

## 9) Solis Station

### (1) Concept Plan

3.31 **Characteristics:** Solis Station is located at the southern part of Manila City and northwest of the Manila City Hall, about 4 km away. While the area around the station is a high-density, low-rise residential area, commercial and industrial facilities are scattered. Except for the National Housing Authority (NHA) housing for ISFs, no major facility serving as a central role exists within 1 km from the station (see Figure 3.10).

3.32 Solis Station is surrounded by minor roads such as barangay roads and subdivision roads. Although the current access to the station from both the east and west are also barangay roads, room for road widening, construction of new road and public transportation facility is very limited due to the lack of available vacant lots.



Source: JICA Study Team.

**Figure 3.10 Concept Plan of Solis Station Area**

3.33 **Issues:** As mentioned above, the area around Solis Station is highly developed and there are no sufficient vacant lots for new development of public transportation facilities and parks, etc. Lack of open spaces/parks triggers increase of the risk for the disaster such as floods and fire in spite of the fact the proposed station is located over the creek. Since the areas along the creek are occupied by ISFs, a redevelopment plan needs

to be prepared not only for the improvements on the accessibility and living environment but also on the disaster management. Development of walkways for pedestrians and bicycle lanes along the creeks improves accessibility and urban amenity as well as provides evacuation routes in case of emergency.

**3.34 Concept Plan:** The concept of TOD for Solis Station is to accelerate the surrounding area's redevelopment by the development of the station area. While the development associated with the NSCR is limited due to the scarcity of land, such development needs to promote the redevelopment in the adjacent areas through its multiplier effects. Utilization of the existing small space and space under the NSCR viaduct for the access improvement needs to be considered to maximize the opportunity of the NSCR project.

**3.35** To implement the redevelopment of areas surrounding the station, coordination among relevant stakeholders such as DOTC, DPWH, and LGUs is essential. At present, information sharing by the relevant stakeholders should continue based on the initiative by DOTC. Incremental redevelopment by City of Manila is expected and needs to be integrated with the NSCR project.

## (2) Transportation Access Improvement Plan

**3.36** Access improvement plan for Solis Station is formulated based on the concept plan and traffic inventory survey. Since there is limited space for development, potential locations for the public transportation facility are either the space under the station/viaduct or the vacant lot at the edge of Juan Luna St. and Hermosa St. Due to the limited availability of the land for road widening and construction of the new roads, coordination and integration with the on-going/planned projects are required to implement necessary access improvement projects.

**3.37** In addition to the road widening and construction of the new road, the access improvement plan includes the intersection capacity enhancement by the installation of traffic signals as well as by other measures of traffic control and management (see Figure 3.11). As shown in Table 3.9, important measures for access improvement are selected as major projects associated with the consideration for their implementation periods and preliminary cost estimation.

**Table 3.9 Profile of Major Projects for Solis Station**

	Project	Term*	Specification (sq.m.)	Cost (PHP000)
1	Road widening of Hermosa St.	Short-term	9,600 (W=15 m, L=640 m)	13,830
2	Road widening of S. Tabora St.	Short-term	4,725 (W=15 m, L=315 m)	6,800
3	New Road Construction to Station	Short-term	6,000 (W=15 m, L=400 m)	39,670
5	Development of public transport terminal	Short-term	About 1.0 hectare	33,870
7	Installation of traffic signals	Medium-term	4 intersections	8,000
8	Road widening of other access roads within 1 km radius from the station	Medium-term	14,400 (W=12m, L=1,200 m)	95,200
9	Development of other new access roads within 1 km radius from the station	Medium-term	840 (W=12 m, L=70 m)	4,6420

Source: JICA Study Team

\*Short-Term: by 2020, Mid-term: by 2020–2030, Mid- to Long- term: by 2030-2040



Source: JICA Study Team.

**Figure 3.11 Transport Access Improvement Plan of Solis Station Area**

## 10) Tutuban Station

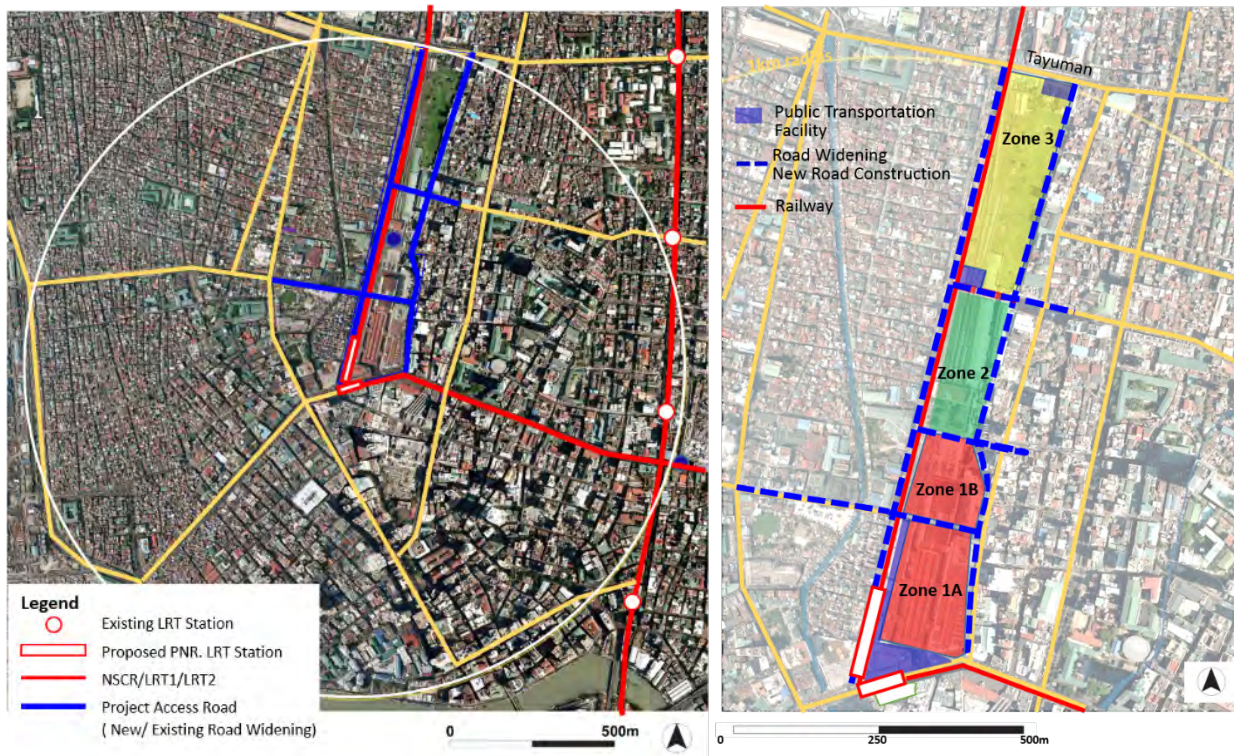
### (1) Concept Plan

3.38 **Characteristics:** The Tutuban area used to be a center of Manila and still has various potentials to revitalize the central Manila considering its history and location. Both the NSCR and LRT2 Tutuban stations are proposed at the south end of the existing Tutuban Mall, approximately 500m south from the existing PNR Tutuban Station. The south side of Tutuban Station area is called Divisoria, a district is famous for various local market and the oldest Chinatown in the world. In spite of the heavy foot and vehicular traffic, many roads are used by the students for their access to the schools concentrated especially on the north side of C.M. Recto Ave.

3.39 **Issues:** Traffic congestion is the major issue in the Tutuban area which makes commuting inconvenient and unsafe for students, office workers as well as local residents. The traffic congestion also triggers air pollution by vehicle emissions. Traffic congestion is caused not only by the street vendors but is also aggravated by the poor traffic management of major roads around the PNR property such as Dagupan St. and A. Rivera St. where there is uncontrolled street parking and inappropriate jeepney operation. Another factor causing traffic congestion is the insufficient width of national roads surrounding the PNR property. These roads do not satisfy the required minimum width of 20 m for national roads. Although the street vendors currently cause traffic congestion, if properly they are relocated, organized and managed in an appropriate manner, they can revitalize the socioeconomic activities in the area.

3.40 Due to the high-density low-rise housing development around the station, the area is densely populated. The limited number of open space and parks is one of the major issues in the area in terms of disaster prevention and urban amenity. On the other hand, the large population has potential to support the revitalization of the area if proper development is implemented. Other issues include the occupation of land along creeks by ISFs, a high crime incidence, and a high risk of flood because of the insufficient infrastructure including lack of stormwater detention/retention facilities.

3.41 **Concept Plan:** Since the Tutuban PNR property is the precious consolidated land (approximately 20 hectare) in the highly developed areas in the central Manila with two proposed terminal stations, the redevelopment of Tutuban Station area is expected to be a major transportation hub as well as a catalyst for the redevelopment of the central Manila. To implement the urban revitalization, the theme of TOD is to become a center of Manila by the integration with historic and urban context. The TOD concept plan of the Tutuban Station area focuses on access improvement and integrated development, which are the major components of TOD. Access improvement aims to provide not only benefits to passengers but also safety, convenience and comfort for the community through the establishment of the backbone transport network in the study area and adjacent areas and maximizing the impact of the NSCR and LRT2 (see Figure 3.12). In terms of urban development, the Tutuban PNR property will be divided into three zones based on its feature of having a long, north to south area. Zone 1 is an upgraded commercial and business center integrated with the NSCR and LRT2 stations as well as the multi-modal transportation facilities. Zone 2 has a landmark facility with public open space to attract visitors and residents to the area. Zone 3 is a mixed-use area with residential, commercial, business and public facilities.



Source: JICA Study Team.

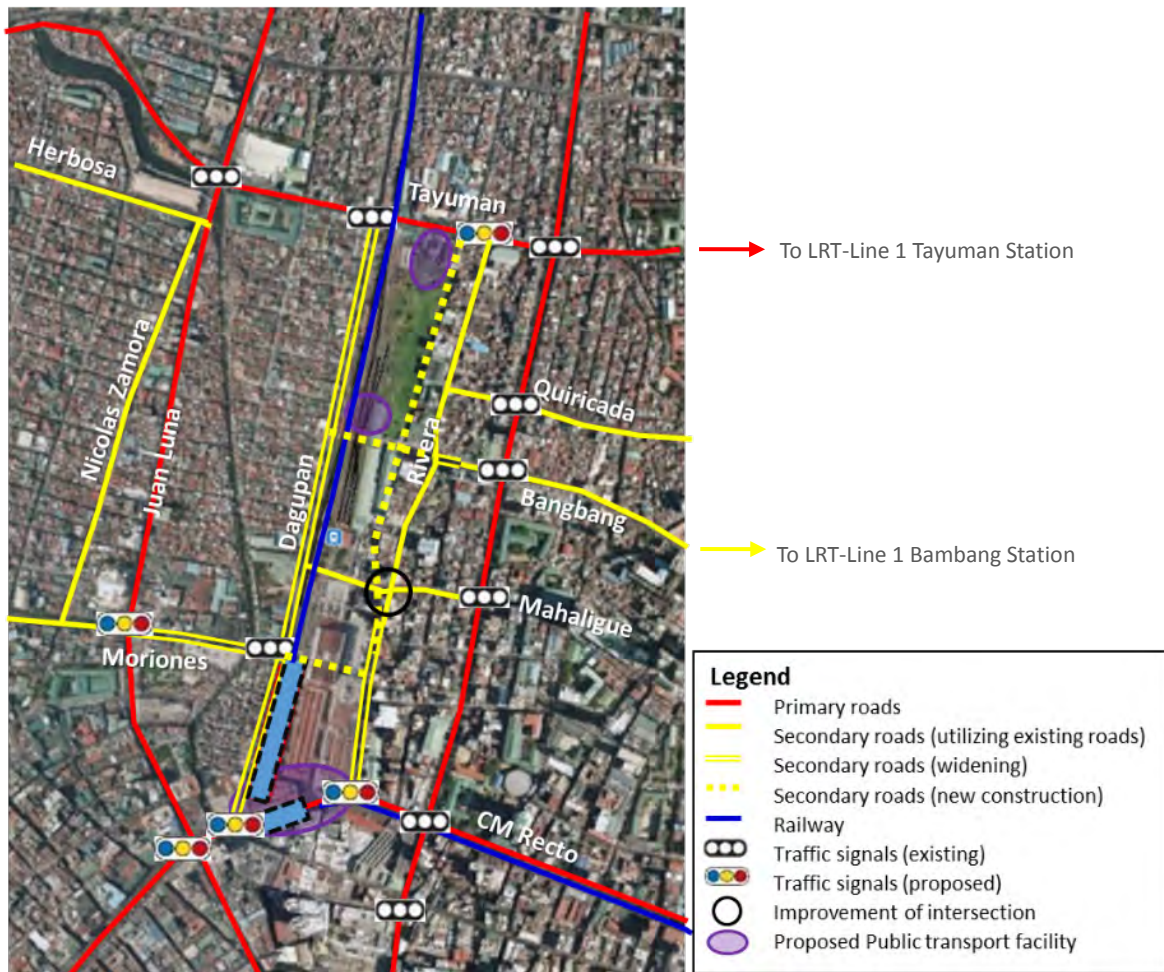
**Figure 3.12 Concept Plan for Access Improvement (left) and Urban Development (right) of Tutuban Station**

**(2) Transportation Access Improvement Plan**

3.42 As with the Caloocan and Solis Station areas, the access improvement plan for Tutuban Station is formulated based on the concept plan and traffic inventory survey. As shown in Figure 3.13, intersection capacity enhancement by installing traffic signals and traffic control and management are proposed in addition to road improvement.

3.43 The implementation terms and stakeholders of the access improvement plan were considered, and their details are described in **Chapter 5**. The most important aspect needs to be considered is that major access improvements, such as road widening projects, have to be completed in time for the opening of the NSCR to maximize its impact. Thus, the widening of Dagupan St. and development of the station plaza at the former Prime Block 1 site where the demolition was completed as of March 2015 became a priority projects to start construction in the first quarter of 2016. These projects are proposed by the Study and processed by the DOTC as of March 2015. Since the road widening projects adjacent to the Tutuban PNR property including Dagupan St. widening will be implemented by utilizing the PNR property, close coordination among stakeholders such as DOTC, PNR, DPWH and City of Manila is essential.





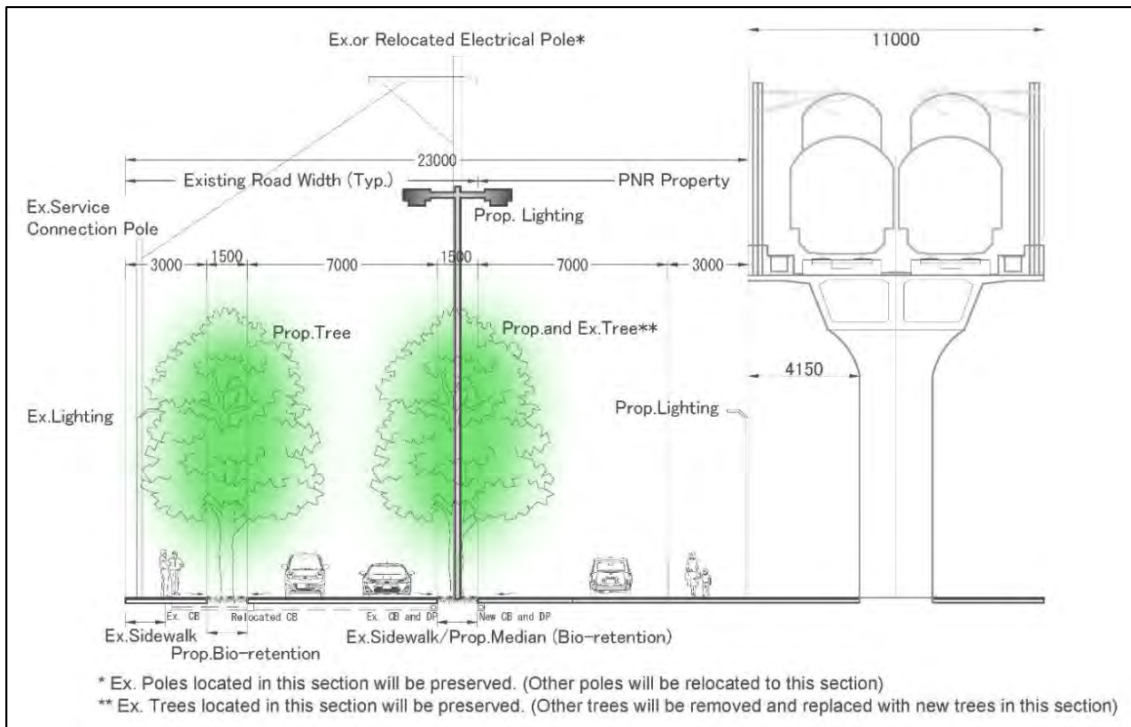
Source: JICA Study Team.

**Figure 3.13 Access Improvement Plan of Tutuban Station Area**

### (3) Detailed Access Improvement Plan

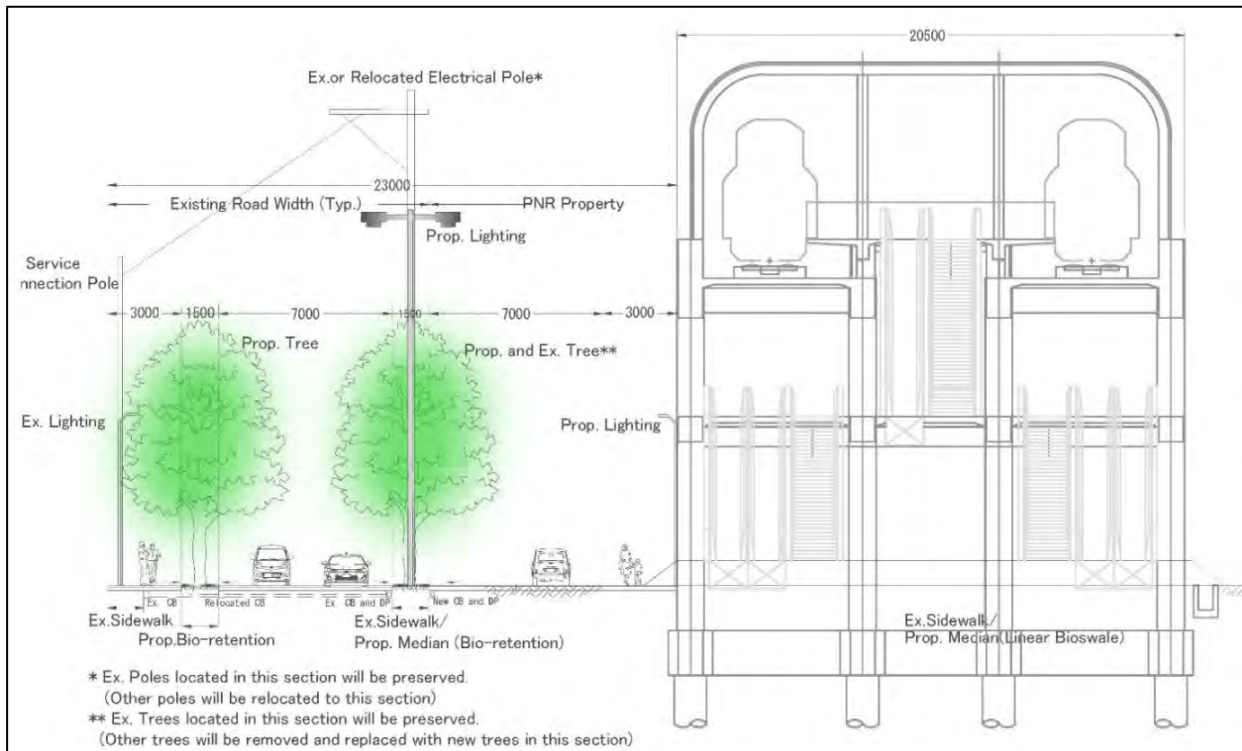
3.44 Considering the important role of the Tutuban Station area in the central Manila and the complexity of the existing issues need to be solved for the implementation of TOD, a detailed access improvement plan is formulated including the typical sections of the road widening projects (see Figures 3.14 to 3.17). Installation of linear planting strips along Dagupan St. and Moriones St. will provide a shade for pedestrians as well as bioretention which intercepts stormwater and mitigates road flooding. As a part of enhancement of traffic control, location and types of pedestrian crossing, traffic signals, signs, and pavement markings are studied and compiled as one of the detailed access improvement plans.

3.45 The location and contents of the proposed public transportation is also specified in the detailed access improvement plan. As previously described, since the Dagupan St. widening and development of the station plaza are currently proceeded by the DOTC as the immediate-term project, necessary documents to support implementation such as TOR for detailed design were prepared by the Study. Information center is proposed in the station plaza as shown in Figure 3.18 which disseminates information to the general public about the NSCR project as well as entire Tutuban area redevelopment and history of Tutuban Station.



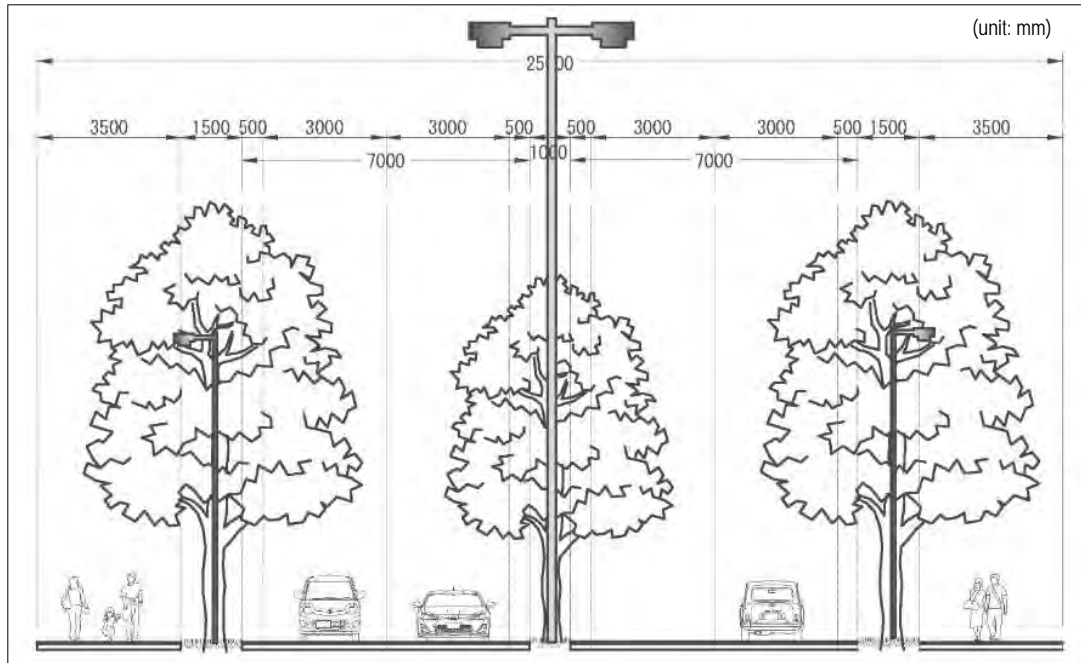
Source: JICA Study Team.

**Figure 3.14 Typical Section Plan of Dagupan St. Widening (Viaduct Section)**



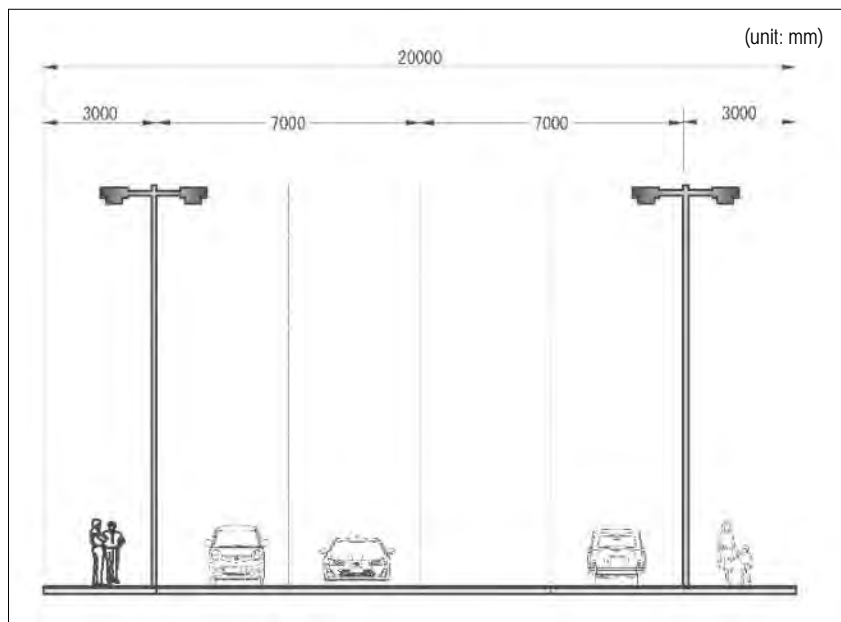
Source: JICA Study Team.

**Figure 3.15 Typical Section Plan of Dagupan St. Widening (Station Section)**



Source: JICA Study Team.

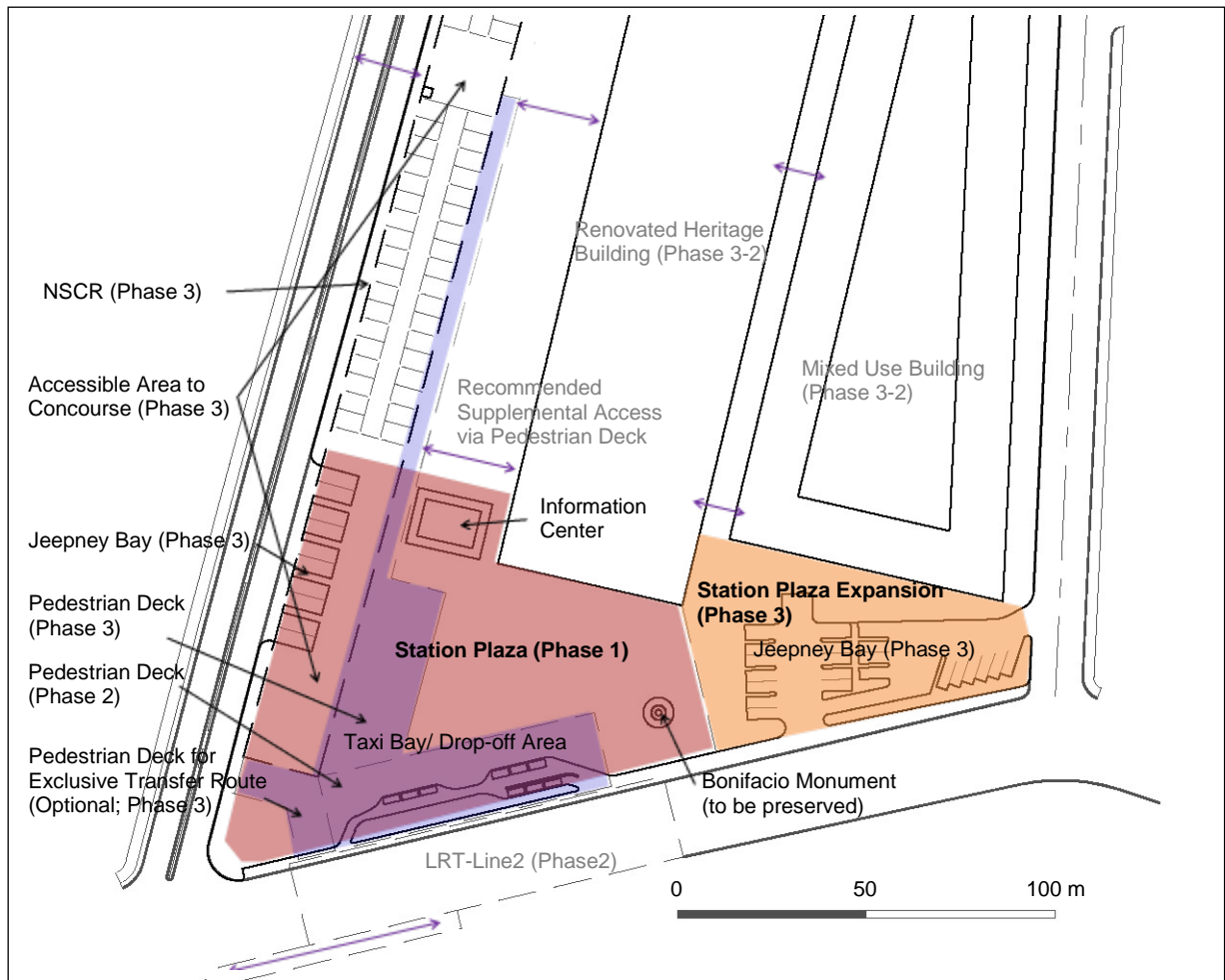
**Figure 3.16 Typical Section Plan of Moriones St. Widening**



Source: JICA Study Team.

**Figure 3.17 Typical Section Plan of Rivera St. Widening**

3.46 The station plaza is proposed to be implemented in three phases by both the public and private sectors as shown in Figure 3.18. Hence, close coordination among the implementers is essential to avoid any physical gaps such as the difference in levels of the road pavement and pedestrian deck. Public transportation facilities including road widening and construction of new road proposed by the study of detailed access improvement are summarized in Table 3.10.



Source: JICA Study Team.

**Figure 3.18 Tutuban Station Plaza Plan**

**Table 3.10 Summary of Proposed Public Transportation Facilities at Tutuban Station Area**

No.	Project	Area (hectare)	Contents
1	Dagupan St. Widening	2.94	Proposed width: 23 m (carriageway, median, planting strip, sidewalk)
2	Moriones St. Widening	1.39	Proposed width: 25 m (carriageway, median, planting strip, sidewalk)
3	Rivera St. Widening	0.84	Proposed width: 20 m (carriageway, median, sidewalk)
4	Mayhaligue St. Restoration	0.33	
5	Bambang St. Widening	0.10	
6	Tutuban Station Plaza (ground floor level; phase1 and 3)	0.92	Jeepney bays (min.10 bays), Taxi bay/Drop-off area, Information Center
	Tutuban Station Plaza (second floor level)	0.50	Pedestrian deck for NSCR and LRT 2 Tutuban Stations including stairs / escalators, elevator
	Tutuban Station Plaza (ground floor level; phase 3)	0.19	Jeepney bays (min. 22 bays)
7	New Access Roads	2.45	Proposed width: 20 m (carriageway, median, sidewalk)
8	New PNR Station Plaza	0.25	Drop-off area, Parking (min. 50 stalls)
9	Public Transportation Facility	0.40	Drop-off area, Parking (min.30 stalls), Jeepney bays (min. 4 bays)
10	Jeepney Bay under Viaduct 1 (Corner of Moriones St. and Dagupan St.)	0.06	Jeepney bays (min. 4 bays) including boarding/alighting area
11	Jeepney Bay under Viaduct 2 (Corner of Mayhaligue St. and Dagupan St.)	0.04	Jeepney bays (min.10 bays), Taxi bay/Drop-off area, Information Center
12	Pedestrian Deck connecting Facilities	0.19	Proposed minimum width: 5m

: JICA Study Team.

## 4. REDEVELOPMENT PLAN OF TUTUBAN STATION AREA

### 4.1 Background of Tutuban Station Area

#### 1) History of Tutuban Station, PNR Railway, and the Tutuban Mall

4.1 The Tutuban station was constructed in 1887 as the terminal station of the Manila-Dagupan Ferrocarril line which was 195.4 km long at the time of its opening in 1892. The Ferrocarril de Manila–Dagupan became the Manila Railroad Company (MRRCo) during the American colonial period (1898–1946). Although MRRCo expanded its railroad network to 1,140 route-kilometers, most of the rail network were lost during World War II. Only 452 route-kilometers were operational after the war. In 1946, the US Army restored the control of the railway to the Commonwealth Government. From 1954 to 1956, MRRCo converted its fleet of trains from steam to diesel engines. Within the following decade, MRRCo was given a new charter under Republic Act No. 4156, and the company changed its name to the Philippine National Railways (PNR).

4.2 In 1991, the station was relocated to its current place. The station was renovated in 1993 as the Tutuban Center Mall by Tutuban Properties, Inc. (TPI) with the original structure and facade since the previous Tutuban Station has been listed as a national historical building by the National Historical Commission of the Philippines (NHCP). However, the way it has been preserved does not fully convey its historical importance. Currently Tutuban Mall is operated and managed by TPI including six commercial buildings and a parking building under the lease contract with the PNR (see Figure 4.1.1). Cluster Building 1 was damaged by fire in 2012, has been cleared of debris, and is a vacant lot as of March 2015.



Source: JICA Study Team.

**Figure 4.1.1 Buildings in the Tutuban Mall**

## 2) Trends and Developments in the National Capital Region

4.3 Metro Manila remains as the leading region in terms of gross value added (GVA) share in construction and real estate, renting and business activities. In 2013, Metro Manila accounted for 23.7% of GVA in construction and 53.0% of GVA in real estate. According to trends and developments in the private construction sector, the number of new private construction projects in Metro Manila has decreased but the value of construction increased. This indicates a shift to larger and higher value projects.

4.4 Quezon City had the largest share (21.6%) in total floor area of new private construction projects in Metro Manila from 2012-2014. On the other hand, Paranaque City posted the largest share (25%) in terms of total value of construction. About 60% of new private construction activities in Quezon City are residential projects. In the case of Paranaque, over 80% of the value of construction is in the non-residential sector. In contrast, the share of Manila was only 7.4% in terms of total floor area and 5.8% in terms of total value of construction.

4.5 In the last two years, there have significant declines in the number, floor area and value of construction of new private construction projects in Manila, including the Tondo district where Tutuban Station is located. In particular, the number, floor area and value of construction in Tondo declined by 66.5%, 78.1% and 36.3%, respectively, in the first three quarters of 2014 relative to their comparable figures the previous year.

4.6 In the past 11 quarters, there were 474 new private construction projects in the Tondo area, mostly residential projects accounting for 53%, 74% and 55% of total number, total floor area and total value of construction, respectively. Majority of the residential projects in the Tondo area consist of residential condominium buildings, which account for 61% of total floor area and 59% of total value of construction of new private residential construction projects. As shown in Table 4.1.1, the licenses to sell are issued by the Housing and Land Use Regulatory Board (HLURB) to private real estate developers not only for residential condominium buildings, but also for commercial and parking buildings. Hence, it implies that mixed-use development is promoted.

**Table 4.1.1 Projects with Licenses to Sell in the Tondo Area**

Project Name	Address	Area (hectare)	Res.	Com.	PL
The Orchard Tower	Juan Luna St., Tondo	0.117	201	16	28
Supreme Garden Residences	Cor. P. Algue and Sanchez Sts., Tondo	0.073	72	4	64
Orchard Residences	1311-1325 Masangkay St., Brgy. 262, Tondo	0.289	197	-	496

Source: HLURB.

Note: Res. = Residential, Com. = Commercial, PL = Parking lots.

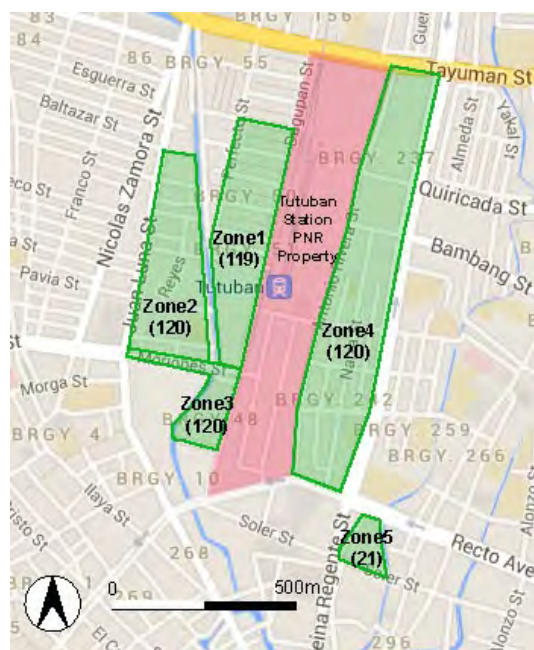
4.7 In terms of new private non-residential construction projects in the Tondo area, the major projects involve commercial building construction which accounts for 56% of total floor area and 47% of total value of construction. Construction of public facilities such as school and health care facilities accounts for 34% of total floor area and 43% of total value of the projects in Tondo area and becomes the second largest sector in non-residential projects in the Tondo area. The results correspond to the existing land use of the area with many schools and hospitals. While most of the major commercial facilities in Tondo are popular community malls such as Tutuban Mall, 168 Shopping Mall, 999 Shopping Mall, Megaworld Corporation bucked the trend by establishing the Lucky China Town Mall which features large-scale commercial and residential spaces and upscale shopping and food establishments. Subsequently, new commercial facilities in the area have diversified.

The Dragon 8 Shopping Center currently under construction at the corner of Dagupan St. and C.M. Recto Ave. by Double Dragon Properties is envisioned to be one of the most modern *tiangge* (bazaar or flea market) shopping centers in the area.

### 3) Potential Affected People by the Tutuban Redevelopment Project and Their Current Situation

#### (1) Residents in Tutuban Area

4.8 The household interview survey was conducted for a sample size of 500 households in five zones around the Tutuban Station area. As shown in Figure 4.1.2, Zones 1 to 3 are where low-rise high-density housing is concentrated, though Zone 3 is adjacent to the property of a new high-rise condominium under construction. Zone 4 is utilized for industrial and residential areas. Zone 5 is mainly a commercial area with a small number of houses.



Source: JICA Study Team.

**Figure 4.1.2 Household Survey Area and Sample Number**

4.9 Survey results show that 20% of households live in their current houses for more than 50 years, and 42% of households own their houses and lots. On the other hand, 9% are ISFs who live in the properties without the landowners' consent. In addition, there are many households who do not pay rent with the house owner's consent, and this category implies the possibility to include a large number of ISFs. Taking this into consideration, the total number of ISFs is approximately 20% of all households in the survey area.

4.10 A typical house in the area is generally small. 8.8% of total households live in the houses with a floor area of less than 10 sq.m, and 45.0% of total households live in the houses of 10-29 sq.m area. According to the 2011 Annual Poverty Indicators Survey published by the National Statistics Office (NSO), the share of households in Metro Manila living in houses with a floor area less than 10 sq.m is 0.1%, and less than 10-29 sq.m is 32.0%. This ratio indicates that there are a large number of low-income people in the Tutuban Station area. The most serious problem in the area is the insufficient existing drainage system. More than half of the household respondents experienced flood in the

past year. Aside from the drainage issue, people feel that greenery and playground space is limited. It highlights the importance of open space such as parks. More than half of the households are unsatisfied with the safety/security conditions in the area. Therefore, all these issues should be considered for the implementation of Tutuban area redevelopment by TOD.

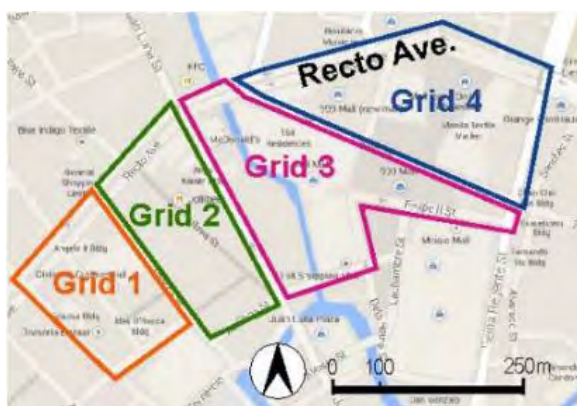
4.11 Considering the potential relocation due to the redevelopment projects influenced by the redevelopment of the Tutuban PNR property, willingness to move to the area along NSCR was confirmed. While about 30% of households are interested in moving to the area, 70% are not interested in moving as they are already satisfied with their current places and they would face the difficulty in commuting if they move. Since the NSCR will connect Malolos to Tutuban in about 30 minutes, the entire NSCR corridor will become a commutable area. Therefore, the NSCR project is expected to promote resettlement in order to mitigate the excessive population density and prevent the degradation of living environment in Metro Manila.

### (2) Tutuban Mall Tenants

4.12 Since Tutuban Mall will be affected by the construction of the NSCR and the redevelopment of the Tutuban PNR property, an interview survey was conducted for all tenants in the Tutuban Mall. Regarding the vacancy rate, Center Mall 1 has 10% of vacant space, Center Mall 2 has 24%, Prime Block has 27%, and Cluster Building 2 has 62%. The large vacant space in Cluster Building 2 stems from the loss of its major access from C.M. Recto Ave. via Cluster Building 1 destroyed by fire in 2012. There are also vacant stalls as well as an unused gym and exhibition space on the fourth floor of Prime Block. These spaces can be utilized as a temporary relocation site for the affected street vendors by the construction of LRT 2 west extension project.

### (3) Street Vendors

4.13 The Divisoria area has a lot of street vendors and especially the vendors along C.M. Recto Avenue cause serious traffic congestion. Since retrieving the transportation function of C.M. Recto Ave. is necessary to implement TOD in Tutuban area, a survey was conducted among 241 randomly selected street vendors in four grids in the area (see Figure 4.1.3) to find out the clue for the solution. Total number of the street vendors identified in these grids is 3,436 as shown in Figure 4.1.4.



Source: JICA Study Team.

**Figure 4.1.3 Street Vendors Survey Area**



Source: JICA Study Team

**Figure 4.1.4 Number of Vendors per Road**



4.14 Street vendors sell various merchandise. While the major category in the total area is dry goods (e.g., fabric, clothing, thread), there are some distinctions in other type of goods sold in each grid. Grid 1 has many vendors selling food such as vegetables and fruits. Grid 2 has relatively many vendors selling seasonal items. Grid 3 has many vendors selling jewelry/accessories and beauty/health products. Most of the vendors in Grid 4 sell dry goods.

4.15 Approximately 64% of vendors have business permits from the Manila City Government and their management is by two vendors' associations accredited by the LGU. Concerning the number of vendors, reorganization of the management system is required. To improve traffic along C.M. Recto Avenue, the vendors need to be relocated to another place such as under the viaduct of the NSCR in the future. In implementing the relocation, it is necessary to establish a management system in coordination with the relevant stakeholders.

4.16 Regarding their problems and concerns, only 10% of the vendors responded that they are satisfied with the current business environment. The other vendors have issues regarding location, cleanliness, rent, competition, store size, number of customers, and safety/security. The relocation site for the street vendors is expected to solve these issues. As shown in Table 4.1.2, the most favorable conditions for the relocation are moving to (i) an open space or (ii) an alternative vending zone inside the mall. In order to implement the smooth relocation, sharing the future vision of Tutuban area redevelopment with the vendors is essential. Improvement of transportation function along C.M. Recto Ave. is necessary to maximize the benefits of the PNR project as well as the Tutuban area redevelopment. Successful redevelopment will attract more customers at the relocation site, which will expand business opportunities of the vendors.

**Table 4.1.2 Required Conditions for Relocation**

Condition for Relocation (for vendors who agree to relocate)	No.	%
Compensation	4	6.3
Alternative vending zone inside the mall	24	37.5
Alternative vending zone under the viaduct	8	12.5
Open space	26	40.6
Alternative vending zone where can be commutable	1	1.6
Others	1	1.6
Total	64	100

Source: JICA Study Team.

## 4.2 Concept Design for Station Area Redevelopment

4.17 The concept design for the Tutuban PNR property was prepared based on the concept plan, access improvement plan, and detailed access improvement plan. The concept design aims to specify the proposed facilities, including their layout, based on the design guidelines.

### 1) Proposed Land Use

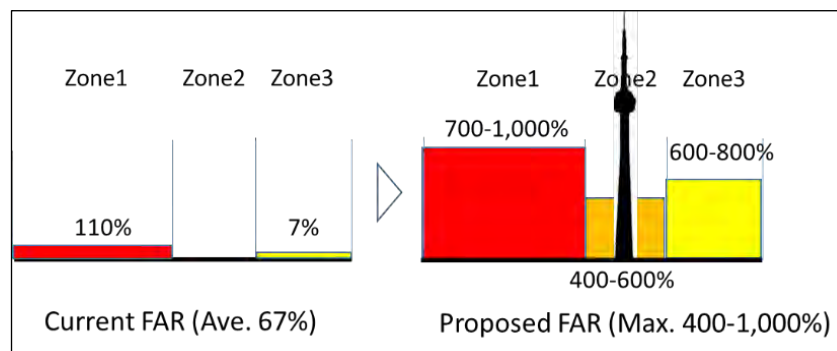
4.18 Based on the prepared plans above-mentioned, the scope and scale of the proposed facilities were studied to determine the intensity of land use by taking the current zoning ordinance into consideration. While percentage of land occupancy (PLO) is proposed to be below the maximum percentage specified in the zoning ordinance to secure the sufficient open space as shown in Table 4.2.1, the floor area ratio (FAR) is proposed to have certain flexibility to promote intensification of land use. Although all FARs of proposed concept design comply with the current zoning ordinance, possibility to stretch the limits should be studied as long as it benefits more to the public than the proposal under the current zoning ordinance. Certain criteria needs to be established by the Design Guideline Committee proposed in **Chapter 5** to approve some exceptions.

**Table 4.2.1 Summary of Land Use Intensity**

Area	Maximum No. by City Ordinance		Maximum No. by Study Team Proposal (Specific No. for Concept Design)	
	PLO	FAR	PLO	FAR
Zone 1	0.8	7	0.5 (0.48)	7-10 (3.98)
Zone 2	0.6	4	0.5 (0.42)	4-6 (2.69)
Zone 3	0.8	6	0.4 (0.32)	6-8 (5.59*)

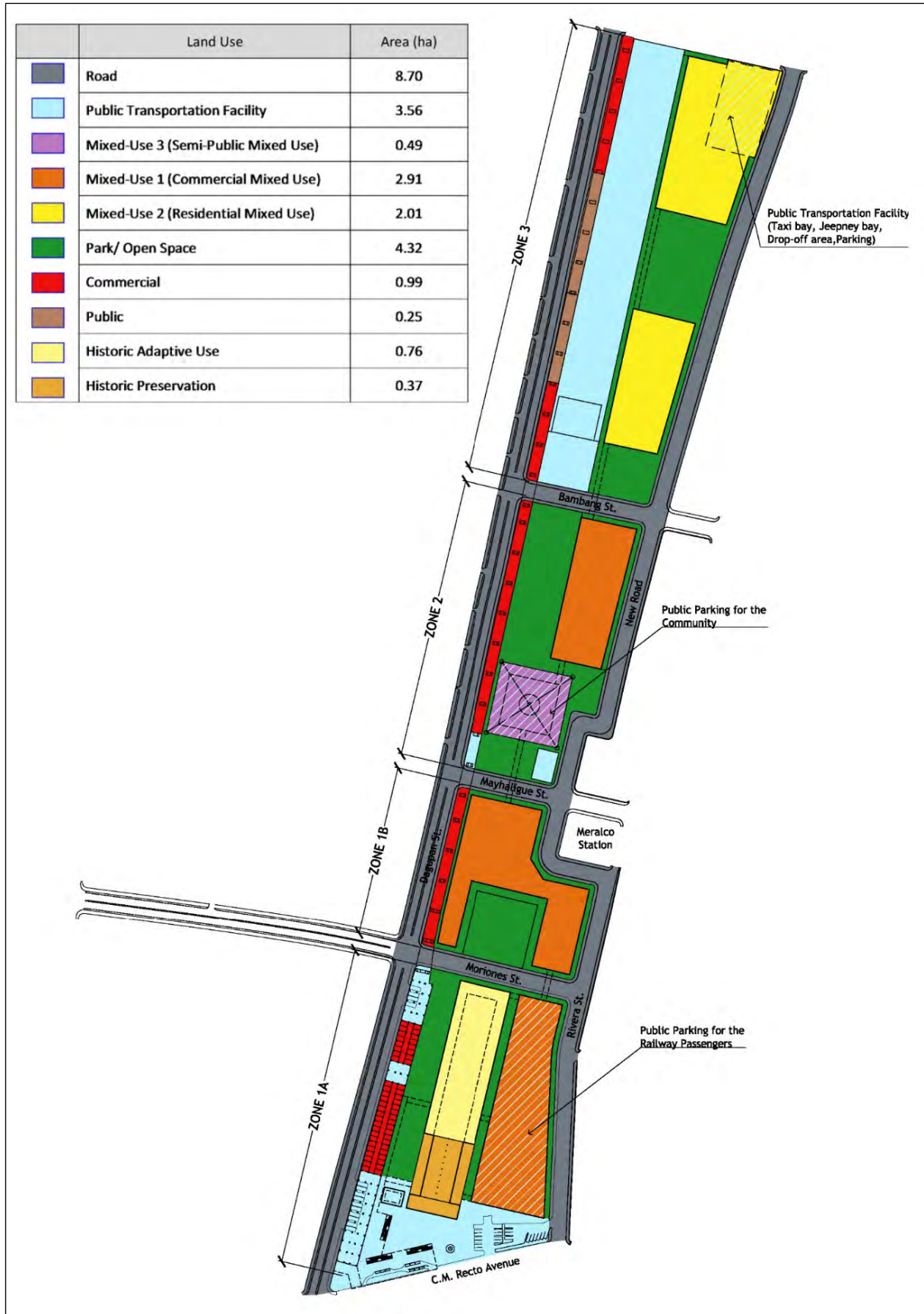
Source: JICA Study Team.

Note: PLO - Percentage of Land Occupancy; FAR - Floor Area Ratio



Source: JICA Study Team.

**Figure 4.2.1 Intensification of Land Use**



Source: JICA Study Team.

Figure 4.2.2 Proposed Land Use Plan

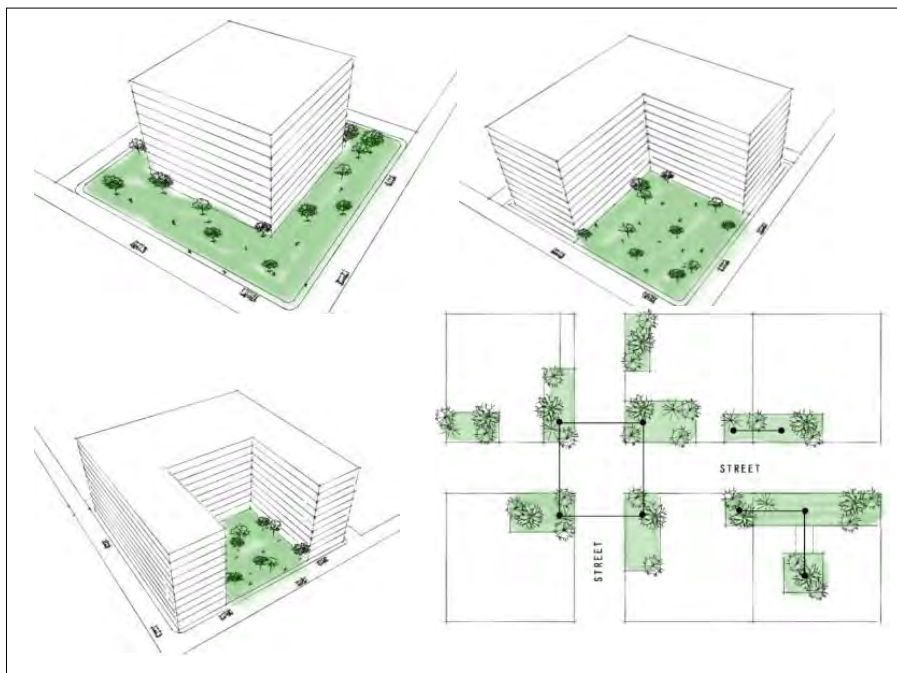
## 2) General Design Guidelines

### (1) Public Facilities and Infrastructures

4.19 Since redevelopment projects in the Philippines tend to be implemented by the private sector, public design guidelines are essential to secure sufficient public facilities and promote the development of necessary infrastructure including the roads. In the case of the Tutuban area redevelopment, several public transportation facilities are proposed to be implemented by the private sector as part of the development for each zone. Since the development of infrastructures need to be coordinated among the DOTC, the DPWH and City of Manila, the redevelopment project can be implemented by PPP and managed by a Project Steering Committee as proposed in **Chapter 5**.

### (2) Open Space

4.20 Securing open spaces such as landscaped greenbelts and parks is important not only for the disaster prevention but also for the improvement on the urban environment and amenity. Therefore, open spaces in Tutuban PNR property need to be planned in sufficient scale, requiring a minimum of 0.3 hectare of consolidated open space for all zones. In addition, a minimum of 1.4 hectare of open space is required for Zone 2 and 1.0 hectare for Zone 3. Open spaces need to be linked to promote social interaction, provide visual relief, and enhance environmental integrity (see Figure 4.2.3).



Source: JICA Study Team.

**Figure 4.2.3 Examples of Configuration of Open Spaces**

### (3) Pedestrian and Vehicular Circulation

4.21 Since vehicular access is limited to the roads surrounding each zone, all zones should allow pedestrians to move freely without any intrusion of vehicles. Due to its vulnerability to flooding, the finished floor elevation for the first floor of the building including the NSCR station will be around 1.0 m higher than the ground elevation. Therefore, universal access, such as installation of slopes with an appropriate gradient (1/8 maximum for inside, 1/20 maximum for outside), needs to be considered and provided.

#### (4) Parking

4.22 Parking lots are recommended to be located underground to maximize the limited space on or above ground as well as to ensure the vibrant atmosphere on the ground level. The minimum parking requirements should comply with Rule VII of the National Building Code. Underground parking should not exceed a maximum of three basement floors, and needs to be equipped with appropriate mechanical equipment in case of emergency such as flooding and fire. In addition to the parking spaces for each facility, a public parking for railway passengers in Zone 1 and a public parking for the entire Tutuban area in Zone 2 are proposed.

### 3) Concept Design of Zone 1

4.23 The current location of Tutuban Center Mall 1 has a historic marker by the NHCP attesting to its preservation of the original facade as well as columns, beams and roof trusses. It follows that the preservation of these structures needs to be included in the concept design as well. In the Study, two alternatives were considered for Zone 1-A. Alternative 1 proposes the preservation of the existing structure with two stories. It is necessary to establish the building with 15 m to 20 m width to increase the zonal FAR due to the low FAR of the heritage building. Since the space between the NSCR Tutuban Station and the heritage building is limited, a minimum distance of 8-9 m recommended in the National Building Code to maximize the benefits of natural lighting and ventilation cannot be secured (see Figure 4.2.4).

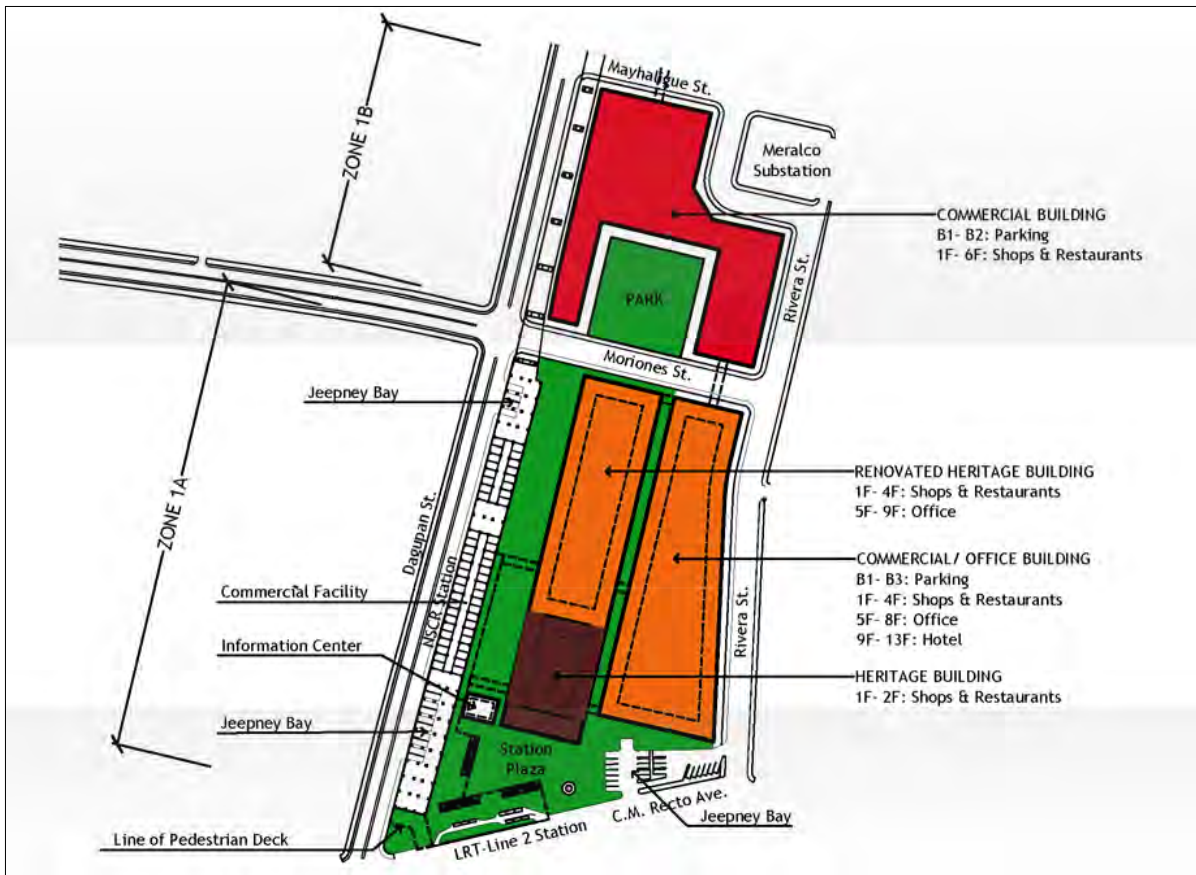


Source: JICA Study Team.

**Figure 4.2.4 Concept Design of Zone 1A (Alternative 1)**

4.24 Alternative 2 introduces a strategic adaptive re-use approach that will still retain the basic elements of the heritage building and exhibit its front facade, 10 bays of original steel columns, trusses and roof, but will allow the use of the space of the back part above the rest of the 18 bays of columns (see Figure 4.2.5). As a result, the practical minimum requirement of 8 m distance will be secured for the heritage building. Also by making the station plaza open, the heritage building and the monument of national hero Andres

Bonifacio can be seen from the open view (see Figure 4.2.6).



Source: JICA Study Team.

**Figure 4.2.5 Concept Design of Zones 1-A and 1-B under Alternative 2 (Preferred Option)**



Source: JICA Study Team.

**Figure 4.2.6 Image of Station Plaza of Tutuban Station**

4.25 As shown in Figure 4.2.7, the facilities of Zone 1-B are planned to be solely commercial, inheriting the character of the existing Tutuban Mall as it is designed to be a relocation site for the current shops in the mall. The commercial building is proposed to be constructed at the open space which is currently utilized for parking. Since the existing Tutuban Mall location is proposed to be a park after demolition of the mall, the open space has a possibility to be used as a relocation site for the street vendors to be affected by the future LRT2 construction. It is important to develop the commercial facility in Zone 1-B promptly to facilitate a smooth process of relocating the Tutuban Mall tenants in order to

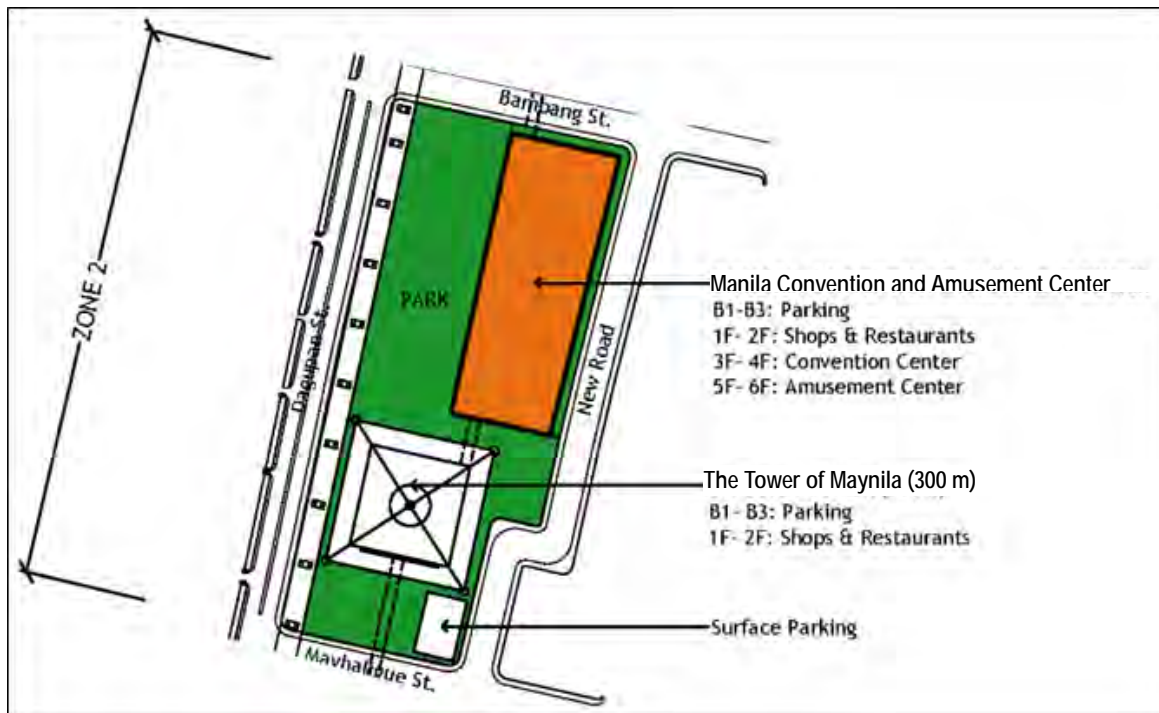
complete the redevelopment of Zone 1-A by the NSCR operation in 2020.

4.26 Since the space under the NSCR viaduct in Zone 1 is adjacent to the first floor of Tutuban Station, public transportation facilities such as jeepney bay and access area to the second floor concourse are proposed. The development of commercial facilities are important as well. Various types of shops can be accommodated under the viaduct from medium-sized prefabricated shops (20-40 sq.m) to small shops (2-4 sq.m). The space has a high possibility to be a relocation site for the street vendors to be affected by the LRT 2 project.

#### 4) Concept Design of Zone 2

4.27 Zone 2 is planned to be a landmark area since The Tower of Maynila, with a height of about 300 m, is expected to attract visitors worldwide together with a convention center which is also planned to create multiplier effects by the integration with commercial facilities in Zones 1 and 3 (hotels, offices, shops and restaurants) (see Figure 4.2.7 and Figure 4.2.8). Since the park can be utilized for festivals and events, it can secure a public characteristic and increase the potential of attracting customers to Zone 2 as well as to the entire Tutuban PNR property.

4.28 As in the other zones, the space under the NSCR viaduct in this zone is proposed to be utilized for both commercial and public transportation facilities (jeepney terminal). This space is also an alternative relocation site for the street vendors to be affected by the LRT 2 project.



Source: JICA Study Team.

**Figure 4.2.7 Concept Design of Zone 2**



Source: JICA Study Team.

**Figure 4.2.8 Image of The Maynila Tower (Draft)**

### **5) Concept Design of Zone 3**

4.29 Zone 3 is planned to offer a new urban lifestyle by providing two 26-storey mixed-use buildings conforming with the CLUP. The zone will consist of residential, commercial, office and public facilities including parks. Both buildings will be facing the large park as a total of 1.0 hectare of open space is required in this zone. The high-rise buildings will make the urban skyline fitting as the center of the City of Manila (see Figures 4.2.9 to 4.2.11).

4.30 A public transportation facility is proposed at the ground floor of the mixed-use building facing Tayuman St. due to its major role in the public transportation network. To secure the public transportation facilities in the private development project, the project is proposed to be implemented under a PPP scheme. Project Steering Committee is proposed to implement the relevant PPP projects for the implementation of Tutuban area redevelopment as described in **Chapter 5**.

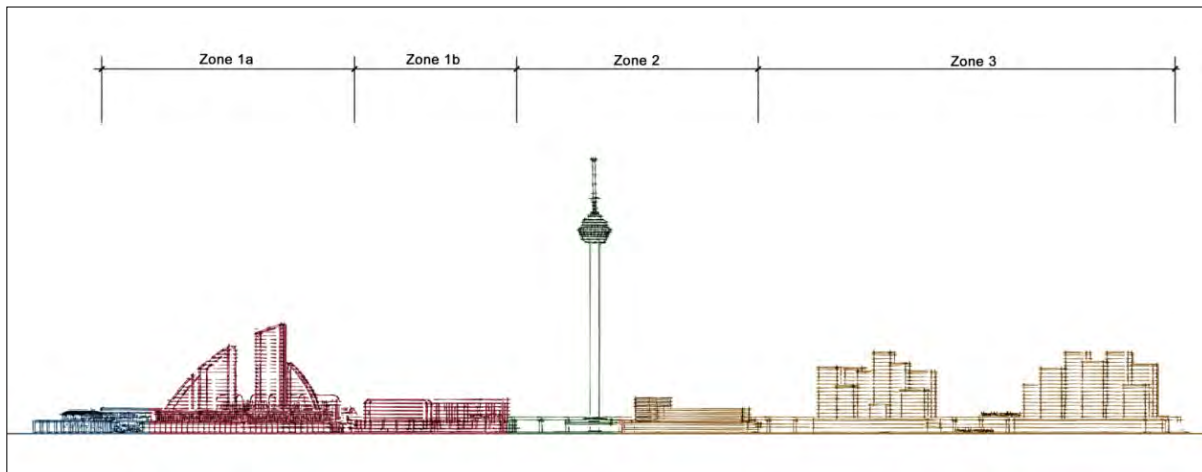
4.31 Some barangay offices/halls, daycare center and small commercial shops are currently illegally occupying the east side of Dagupan St. as well as PNR property in Zone 3. Since they will be demolished by Dagupan St. widening project, the space under the NSCR viaduct in this zone is proposed to be utilized for both commercial and public facilities which can supplement the functions of those demolished facilities.





Source: JICA Study Team.

**Figure 4.2.9 Concept Design of Zone 3**



Source: JICA Study Team.

**Figure 4.2.10 Proposed Skyline of Tutuban Redevelopment Project**



Source: JICA Study Team.

**Figure 4.2.11 Image of Aerial View of Tutuban Redevelopment**

## 5. PROJECT IMPLEMENTATION PLANNING FOR TUTUBAN REDEVELOPMENT AREA

### 5.1 Proposed Project Implementation Plan, Schedule and Preliminary Cost Estimate

5.1 Since many stakeholders are involved in the Tutuban Redevelopment Project, close coordination among those stakeholders will be essential for project implementation. The major stakeholders identified by the Study are the DOTC as implementer of the NSCR and LRT2, the PNR as landowner of the Tutuban redevelopment area, and the City of Manila as the LGU with jurisdiction over the project area and which formulated the CLUP and has a significant role to determine the policy for relocation of street vendors. In terms of implementation of access improvement, coordination with the DPWH and the MMDA is important as well. The major private sector stakeholder is Prime Orion Philippines, Inc., a parent company of TPI, lessee of the Tutuban PNR property.

5.2 As described in **Chapter 4**, the concept design for the Tutuban PNR property includes public projects to be implemented by the DOTC, DPWH and the City of Manila as well as the projects to be developed by the private sector. The project area needs to be developed and maintained in coordination with the relevant public sector. Preliminary cost estimates place the total project cost is approximately PHP33 billion. As shown in Table 5.1.1, several projects should be conducted earlier than the others to complete necessary relocation in a timely manner as well as to maximize the benefits of the NSCR.

**Table 5.1.1 Estimated Project Cost and Schedule for the Tutuban Redevelopment Project (In PHP million unless stated otherwise, constant 2015 prices)**

Zone	Items	Land Area (hectare.)	Floor Area (hectare.)	Construction Cost (PHP million)	Year to be Completed
Zones 1-3	Dagupan St. Widening	-	-	139.25	2016
Zones 1-2	Jeepney Bay under Viaduct	0.22	-	6.30	2020
Zones 1-3	Commercial Facility under Viaduct	0.80	-	326.18	2020
Zones 1-3	Moriones St. Widening		-	38.61	2025
Zone 1-A	Station Plaza Phase 1	0.92	-	87.61	2016
	Station Plaza Phase 2	0.37	-	14.65	2020
	Pedestrian Deck(NSCR)	-	0.34	381.00	2020
	Pedestrian Deck(LRT2)	-	0.16	193.50	2018
	Pedestrian Deck (other)	-	0.05	52.24	2020
	Renovated Heritage Building	1.20	6.61	2,740.94	2020
	Mixed Use Building 1-A	2.00	12.14	5,482.94	2020
	Access Road for Zone 1 (1-A + 1-B)	1.56	-	72.55	2020
	Internal Path/Landscaped Area 1-A	1.35	-	71.55	2020
Zone 1-B	Commercial Building 1-B	1.07	8.56	2,929.66	2018
	Park 1-B	0.38	-	28.50	2020
	Internal Path/Landscaped Area 1-B	0.38	-	41.80	2020
Zone 2	The Tower of Maynila	0.49	1.25	1,094.00	2025
	Manila Convention and Amusement Center	0.73	6.57	2,581.28	2025
	Park 2	1.46	-	160.60	2025
	Surface Parking	0.06	-	2.35	2025
	Pedestrian Deck for Zone 2	-	0.05	55.00	2025
	Access Road for Zone 2	0.60	-	36.69	2025
	Internal Path/Landscaped Area 2	0.10	-	7.50	2025
Zone 3	Public Facility under Viaduct 3	0.25	-	6.72	2020-2030
	New PNR Railway Facilities	2.19		503.45	2018

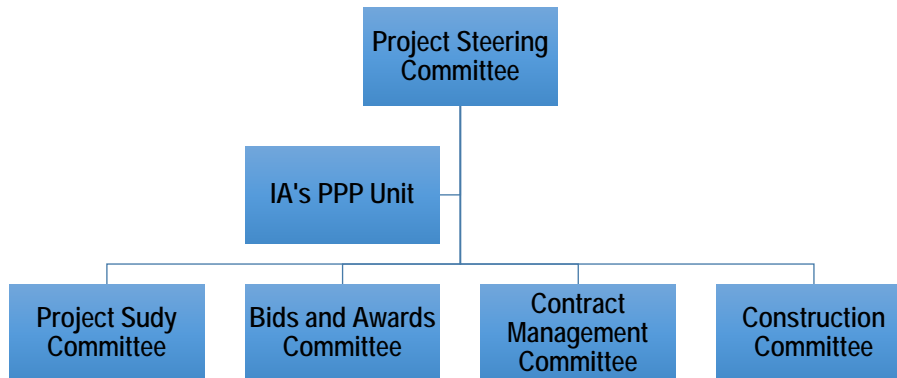
Zone	Items	Land Area (hectare.)	Floor Area (hectare.)	Construction Cost (PHP million)	Year to be Completed
	Access Road for New PNR Station	0.56		18.44	2018
	Mixed-Use Building 3-1	0.75	12.82	6,038.46	2030
	Mixed-Use Building 3-2	0.68	20.66	9,510.46	2030
	Public Transportation Facility	0.50		19.55	2030
	Park 3	1.06		116.60	2030
	Pedestrian Deck for Zone 3		0.09	99.00	2030
	Access Road for Zone 3	0.90		102.69	2030
	Internal Path/Landscaped Area 2	0.37		27.75	2030
	<b>Total</b>	<b>20.95</b>	<b>69.30</b>	<b>32,987.82</b>	

Source: JICA Study Team.

## 5.2 Proposed Project Implementation Scheme and Necessary Consulting Services for Project Implementation

### 1) Implementation Scheme

5.3 PPP implementation process is typically divided into four stages; (i) Identification, Selection and Prioritization, (ii) Preparation, Evaluation and Approval, (iii) Tendering and Negotiation; and (iv) Implementation, Operations and Handover. The Tutuban Redevelopment Project is currently in the project identification stage. Once Stage 1 is completed, DOTC needs to set up a Project Steering Committee as shown in Figure 5.2.1 and to commission the necessary consulting services to form a team of transaction advisors.



Source: National Government Agency Public-Private Partnership Manual, Volume 1, PPP Center.

**Figure 5.2.1 Typical PPP Project Governance Structure**

5.4 The Project Steering Committee will be headed by the DOTC Secretary or his nominee. The PPP Center will also play a major role in the project implementation process by providing technical assistance in the areas of project packaging and feasibility studies, among others. Oversight agencies such as the NEDA, the DOF and the PNR will also be members of the Project Steering Committee. Other major stakeholders such as the DPWH, the MMDA, City of Manila, and TPI/Prime Orion are also proposed to be appointed as the members of the Project Steering Committee.

5.5 The Project Study Committee is composed of the implementation agency's PPP Unit and the PPP Center. Considering the major role that the City of Manila will play in the implementation of the proposed Tutuban Redevelopment Project, it is recommended that its representatives be also designated as the members of the Project Study Committee. Design Guideline Committee is proposed to be established under the Project Study Committee. Major role of the Design Guideline Committee is to finalize the design

guideline of Tutuban Redevelopment project and approve the proposed development by the project. Necessary consulting services to support the Design Guideline Committee need to be identified and commissioned by the DOTC at the earliest opportunity.

5.6 Once the project reaches the operations phase, the Contract Management Committee will need to closely monitor and report on ongoing operations to ensure that management challenges are recognized early on and managed effectively. The DOTC needs to prepare the documents for the monitoring in consultation with major stakeholders such as the DPWH, the MMDA, City of Manila, and TPI/Prime Orion since the Project Steering Committee may undertake periodic inspections for the public facilities proposed by the Tutuban Redevelopment Project.

5.7 The DOTC is responsible to lead the Project Steering Committee as well as to engage a team of transaction advisers to assist the Project Steering Committee in different phases of the preparation and implementation process until the project's financial close is reached.

5.8 Since TOD is a new concept in the Philippines, the DOTC has limited knowledge of its basic principles and processes. Therefore, aspects of capacity building also need to be considered to establish an implementation scheme.

## **2) Necessary Consulting Services for Project Implementation**

5.9 Since the team of transaction advisers plays an important role to support the Project Steering Committee to implement the successful PPP project, the DOTC needs to identify their scope of work carefully and commit the advisers with sufficient ability to undertake the required tasks, as follows:

- Prepare the feasibility study and transaction documents and provide assistance in bid evaluation and award of the project;
- Provide advice on the technical aspects of the feasibility study, design guidelines, draft the design as well as appropriate minimum performance standards and specifications, and evaluate technical components of bids;
- Assess requisite powers and legal feasibility of the project, develop legal aspects of a contract, undertake legal due diligence on bids, provide legal advice on processes throughout the procurement stage to safeguard the integrity of the procurement process;
- Develop financial aspects of the project including project payment mechanisms, undertake financial due diligence of financial bids, evaluate and advise on the financial proposal throughout the procurement stage, and clarify financial and commercial issues;
- Identify project impact on environment/vulnerable groups, ensure gender equality, and recommend mitigating measures to minimize adverse impacts
- Provide advice on the communications strategy of the project, stakeholder management and the consultation process. and
- Support for the NEDA's approval procedure (in the case of national projects with above PHP300 million project cost).

## 5.3 Preliminary Financial and Economic Analysis on Concept Design

### 1) Financial Evaluation

5.10 Discounted cash flow (DCF) analysis was used to determine the financial viability of the proposed Tutuban Redevelopment Project. Free cash flow of the project was computed on the “with-project” and “without-project” scenarios to measure the financial impact of the proposed TOD project.

5.11 Preliminary costs were estimated for all projects proposed by the Study, and the estimated total construction cost for the Tutuban Redevelopment Project is PHP33 billion. Considering the possibility to conduct the entire project under a PPP arrangement, three scenarios were examined in the financial analysis: (i) Scenario 1: all public spaces will be developed by national government agencies; (ii) Scenario 2: the responsibility of constructing the access roads will be given to the private proponent; and (iii) Scenario 3: the private proponent will shoulder all construction costs.

5.12 The financial viability of the project was evaluated from the perspective of the private proponent. The total investment cost cost is PHP30.5 billion under scenario 1, PHP31.3 billion under scenario 2, and PHP33.0 billion under scenario 3, respectively (see Table 5.3.1).

**Table 5.3.1 Estimated Project Cost of the Tutuban Redevelopment Project per Scenario  
 (In PHP million unless stated otherwise, constant 2015 prices)**

Zone	Items	Scenario 1			Scenario 2			Scenario 3
		Private	Public	Total	Private	Public	Total	Private
Zone 1-A	Share of Dagupan St./Moriones St. Widening	-	66.5	66.5	-	66.5	66.5	66.5
	Station Plaza Phase 1 and 2 (Jeepney Bay)	-	102.3	102.3	14.7	87.6	102.3	102.3
	Pedestrian Deck (NSCR/LRT2/Others)	-	626.7	626.7	52.2	574.5	626.7	626.7
	Jeepney Bay under Viaduct	-	5.4	5.4	-	5.4	5.4	5.4
	Commercial Facility under Viaduct	-	165.9	165.9	-	165.9	165.9	165.9
	Renovated Heritage Building	2,740.9	-	2,740.9	2,740.9	-	2,740.9	2,740.9
	Mixed Use Building	5,482.9	-	5,482.9	5,482.9	-	5,482.9	5,482.9
	Access Road for Zone 1 (1-A + 1-B)	-	72.6	72.6	72.6	-	72.6	72.6
	Internal Path/Landscaped Area	71.6	-	71.6	71.6	-	71.6	71.6
Sub-Total	8,295.4	1,039.3	9,334.7	8,434.9	899.8	9,334.7	9,334.7	
Zone 1-B	Share of Dagupan St./Moriones St. Widening	-	29.8	29.8	-	29.8	29.8	29.8
	Commercial Facility under Viaduct	-	61.6	61.6	-	61.6	61.6	61.6
	Commercial Building	2,929.7	-	2,929.7	2,929.7	-	2,929.7	2,929.7
	Park/Internal Path/Landscaped Area	41.8	28.5	70.3	70.3	-	70.3	70.3
	Sub-Total	2,971.5	119.9	3,091.3	3,000.0	91.4	3,091.3	3,091.3
Zone 2	Share of Dagupan St. Widening	-	31.5	31.5	-	31.5	31.5	31.5
	Jeepney Bay under Viaduct	-	0.9	0.9	-	0.9	0.9	0.9
	Commercial Facility under Viaduct	-	34.3	34.3	-	34.3	34.3	34.3
	The Tower of Maynila	1,094.0	-	1,094.0	1,094.0	-	1,094.0	1,094.0
	Manila Convention and Amusement Center	2,581.3	-	2,581.3	2,581.3	-	2,581.3	2,581.3
	Surface Parking	2.4	-	2.4	2.4	-	2.4	2.4
	Pedestrian Deck	-	55.0	55.0	55.0	-	55.0	55.0
	Access Road	-	36.7	36.7	36.7	-	36.7	36.7
	Park/Internal Path/Landscaped Area	7.5	160.6	168.1	168.1	-	168.1	168.1
Sub-Total	3,685.1	319.0	4,004.1	3,937.4	66.7	4,004.1	4,004.1	
Zone 3	Share of Dagupan St. Widening	-	50.2	50.2	-	50.2	50.2	50.2
	Commercial Facility under Viaduct	-	64.4	64.4	-	64.4	64.4	64.4
	Public Facility under Viaduct	-	6.7	6.7	-	6.7	6.7	6.7
	New PNR Railway Facilities	-	503.5	503.5	-	503.5	503.5	503.5
	Access Road for New PNR Station and Zone 3	-	121.1	121.1	102.7	18.4	121.1	121.1
	Mixed-Use Building	15,548.9	-	15,548.9	15,548.9	-	15,548.9	15,548.9
	Public Transportation Facility	-	19.6	19.6	19.6	-	19.6	19.6
	Pedestrian Deck	-	99.0	99.0	99.0	-	99.0	99.0
	Park/Internal Path/Landscaped Area	27.8	116.6	144.4	144.4	-	144.4	144.4
Sub-Total	15,576.7	981.0	16,557.7	15,914.5	643.2	16,557.7	16,557.7	
<b>TOTAL</b>	<b>30,528.7</b>	<b>2,459.1</b>	<b>32,987.8</b>	<b>31,286.8</b>	<b>1,701.1</b>	<b>32,987.8</b>	<b>32,987.8</b>	

Source: JICA Study Team.

5.13 Revenues of the Tutuban Redevelopment Project will come from (i) rental of commercial, office and residential space (fixed component), (ii) lease of hotel space in commercial buildings in Zone 1-A (fixed component), (iii) share of gross sales of commercial establishments (variable component), and (iv) entrance fees from The Tower of Maynila (PHP250/person). The rates, which were assumed to be fixed throughout the life of the project, are comparable with those in the central business districts of Makati and Ortigas.

5.14 Operation and maintenance (O&M) costs are accounted as management and maintenance cost of commercial/business space and residential, real property tax, local business tax, and repairs (small repairs every 5 years and major repairs every 10 years). A fixed rate is set for each revenue and construction cost.

5.15 The results of the financial evaluation show that revenues generated by the project will be enough to cover investment costs, capital expenditures, and O&M costs. The project will realize a financial internal rate of return (FIRR) of 22.4% under Scenario 1, 21.9% under Scenario 2, 19.1% under Scenario 3. All scenarios are beyond the hurdle rate of 15%. In addition, the City of Manila will realize some PHP7,640 million in real property and local business taxes throughout the life of the project.

**Table 5.3.2 Results of Financial Evaluation**

Zone	Scenario 1: Public Max		Scenario 2: Public-Private		Scenario 3: Private Only	
	FIRR (%)	FNPV (PHP million)	FIRR (%)	FNPV (PHP million)	FIRR (%)	FNPV (PHP million)
Zone 1-A	21.4	1,891.1	21.0	1,811.4	18.5	1,215.6
Zone 1-B	26.2	1,532.2	26.0	1,515.9	25.4	1,458.1
Zone 2	26.2	710.1	24.5	638.4	22.7	586.8
Zone 3	15.2	24.2	14.8	-23.5	12.1	-509.0
Project	22.4	4,157.6	21.9	3,942.1	19.1	2,751.6

Source: JICA Study Team.

5.16 As a result of sensitivity analysis of financial evaluation, for the project to realize a FIRR below the 15% hurdle rate, revenues will have to drop by 17% or costs will have to increase by 20.3% under Scenario 1, revenues will have to drop by 16% or costs will have to increase by 19% under Scenario 2, and revenues will have to drop by 11% or costs will have to increase by 12.5% under Scenario 3 relative to the base case.

## 2) Economic Evaluation

5.17 In order to evaluate the economic viability of the proposed Tutuban Redevelopment Project, benefit-cost analysis was undertaken in accordance with the NEDA Reference Manual on Project Development and Evaluation (2005).

5.18 As prescribed by the NEDA, the economic costs will be determined by converting the financial costs into their economic equivalents using the relevant domestic price numeraire. Using the conversion factors<sup>1</sup>, the resulting economic cost was computed to be PHP31.3 billion (see Table 5.3.3). This conversion factor was also used to convert the financial cost of O&M expenses into their economic equivalents.

<sup>1</sup> unskilled labor, 0.6; skilled labor, 1.0; foreign exchange 1.2; and local materials, 1.0.

**Table 5.3.3 Estimated Project Economic Cost for the Tutuban Redevelopment Project  
 (In PHP million unless stated otherwise, constant 2015 prices)**

Zone	Items	Construction Cost (PHP million)	Year to be completed
Zones 1-3	Dagupan St./Moriones Widening	169.0	2016
	Commercial Facility under Viaduct	309.9	2020
	Sub-total	478.9	-
Zones 1-2	Jeepney Bay under Viaduct	6.0	2020
	Sub-total	6.0	-
Zone 1-A	Station Plaza Phase 1 and 2	97.1	2016 - 2020
	Pedestrian Deck (NSCR/LRT2/Other)	595.4	2018 - 2020
	Renovated Heritage Building	2,603.9	2020
	Mixed Use Building	5,208.8	2020
	Access Road for Zone 1 (1-A + 1-B)	68.9	2020
	Internal Path/Landscaped Area	68.0	2020
	Sub-total	8,642.1	-
Zone 1-B	Commercial Building	2,783.2	2018
	Park/Internal Path/Landscaped Area	66.8	2020
	Sub-total	2,850.0	-
Zone 2	The Tower of Maynila	1,039.3	2025
	Manila Convention and Amusement Center	2,452.2	2025
	Surface Parking	2.2	2025
	Pedestrian Deck	52.3	2025
	Access Road	34.9	2025
	Park/Internal Path/Landscaped Area	159.7	2025
	Sub-total	3,740.6	-
Zone 3	Public Facility under Viaduct	6.4	2020-2030
	New PNR Railway Facilities	478.3	2018
	Access Road for New PNR Station	17.5	2018
	Mixed-Use Building	14,771.4	2030
	Public Transportation Facility	18.6	2030
	Pedestrian Deck for Zone 3	94.1	2030
	Access Road for Zone 3	97.6	2030
	Park/Internal Path/Landscaped Area 2	137.2	2030
Sub-total	15,621.1	-	
<b>Total</b>		<b>31,338.4</b>	<b>-</b>

Source: JICA Study Team.

5.19 The economic benefits of TOD projects are supposed to be generated in three areas, namely: transportation (e.g., travel time reduction, traffic decongestions, etc.), urban development (e.g., increase in land value and economic activities, etc.), and social and environment (e.g., job creation, improvement of living environment etc.). However, most of these projects are difficult to value due primarily to data constraints. Hence, only three benefits will be included in the economic analysis—increased land values, job creation and reduction in travel time.

5.20 In the computation of the land value appreciation, it was assumed that for Zones 1-A and 1-B it will take about 10 years to reach Fort Bonifacio's levels of PHP200,000 per sq.m and another 5 years to hit Makati CBD's levels of PHP290,000 per sq.m. For Zones 2 and 3, land values will increase to PHP100,000 per sq.m. after 10 years and to PHP150,000 per sq.m. after another 5 years. Land values will appreciate at a steady rate of 5% per year after the 15th year of operations of the project. The land value appreciation is expected to spill over to 2.5 times the land area of the Tutuban Redevelopment Project or a total area of 35.1 hectare.

5.21 For the job creation, the TOD project is expected to generate jobs in the near future. Assuming sales to employment ratio of PHP50 million-to-one in the retail trade sector, the project will generate some 171 jobs in its first year of operations. The number of jobs



generated will reach its peak of 1,079 by 2033. Their average salary was assumed to be PHP15,000 per month.

5.22 Tutuban Redevelopment Project will also reduce travel time for commuters in the Tutuban area by an estimated two minutes. The total number of passengers using the NSCR and the LRT2 Tutuban Stations is projected to reach 416,300 in 2020 and 377,300 in 2030. The value of time is based on the NCR daily minimum wage of PHP466.

5.23 Based on the abovementioned economic cost and benefits, the economic evaluation for the base case yields an EIRR of 35.5% and an ENPV of PHP1,768.8 million relative to a social discount rate of 15%, and given a project life of 30 years (see Table 5.3.4). These indicate that the proposed Tutuban Redevelopment Project is economically viable.

**Table 5.3.4 Results of the Economic Evaluation**

Indicator	Value
EIRR	35.4%
ENPV	PHP1,754.7 million
Benefit-Cost Ratio	1.09

Source: JICA Study Team.

5.24 A sensitivity analysis was likewise carried out to determine the responsiveness of the EIRR to changes in the economic costs and benefits. For the project to realize an EIRR below the 15% hurdle rate, benefits will have to drop by 8.1% or costs will have to increase by 8.8% relative to the base case (see Table 5.3.5).

**Table 5.3.5 Sensitivity Analysis of Financial Evaluation**

		Change in Cost (%)				
		Base Cost	5% up	10% up	15% up	20% up
Change in Revenues	Base Case	35.4	20.2	13.9	10.3	7.8
	5% down	19.8	13.4	9.9	7.4	5.4
	10% down	13.0	9.4	6.9	4.9	3.3
	15% down	8.9	6.4	4.4	2.8	1.3

Source: JICA Study Team.

## 6. Conclusion and Recommendations

### 1) Overall Conclusion

6.1 TOD is a development approach to promote sustainable urban development in synergy with competitive public transport and associated urban development. Its benefits extend widely not only to public transport users and operators but also to communities, developers and local authorities in different ways, depending on how the TOD plan is designed, implemented and managed.

6.2 TOD along the NSCR project entails three expected outcomes, namely: (i) contribution to mitigating Metro Manila's fundamental issues such as traffic congestion, lack of access to affordable housing, and resettlement from high hazard-risk areas, (ii) contribution to the improvement of living conditions/environment in the influence areas of the NSCR in relevant LGUs through provision of TOD and its related infrastructure, and (iii) promotion of local economic development in the project's influence area, especially at and around the NSCR stations. Although ample opportunities are identified by the Study as described below, currently the practice of TOD in Metro Manila is limited and lacks a shared understanding of the TOD concept among institutions and capable players. Therefore, carrying out the appropriate institutional arrangements is essential to implement TOD.

- (a) **Suburban Areas in Bulacan Province including Malolos, Guiguinto, Balagtas and Bocaue:** These areas have the potential to mitigate the overcrowded population in Metro Manila and to stimulate socioeconomic activities in Bulacan Province by (i) access improvement in the area of influence of the NSCR stations, (ii) integrated urban development at/around the NSCR stations, and (iii) integrated development of medium- to large-scale mixed-use New Towns in Bulacan Province.
- (b) **Peri-urban areas of Metro Manila including Marilao and Meycauayan in Bulacan Province and Valenzuela of Metro Manila:** Utilization of the available vacant lots in these areas will enable the organization of land use, improve the road network, and as a result, stimulate the local economy.
- (c) **Urban areas in Metro Manila including Caloocan, Solis and Tutuban:** These areas have the potential to generate significant positive impacts in terms of transport and socioeconomic development when the PNR properties are properly developed. In particular, redevelopment of the Tutuban Station area can play a major role in revitalizing central Manila.

6.3 The benefits of TOD will cover the areas at and around the stations as well as along the NSCR corridor. Access improvement at each station area provides efficient and effective transfer to the local feeder services which ensures the convenient and comfortable travel between origins and destinations of the NSCR users. Such enhancement in traffic circulation by TOD creates new transport nodes and promotes further improvement of local transportation, which will benefit not only the NSCR passengers but also the entire community as well. Commercial and office development in the station areas by TOD will provide investment opportunities for local communities and businesses which will create jobs and improve incomes.

6.4 To maximize and fairly distribute the TOD benefits, participation of relevant stakeholders throughout the process of planning, implementation and operation is the key

to success. This process must be supported with a clear policy commitment of both central and local governments, an effective institutional framework that controls and guides the activities of the different players, and the active involvement of private sector and local communities.

## 2) Overall Recommendations

6.5 To achieve the expected outcomes of TOD along the NSCR, the following are recommended:

- (i) **Shared understanding and consensus-building on the proposed TOD concept:** Although TOD is a relatively new concept and rarely practiced in the past railway projects in the Philippines, it needs to be implemented prior to the NSCR operation to maximize its benefits. Since TOD encompasses a variety of stakeholders, it is essential to identify them and encourage their involvement at the early stage of planning. The TOD concept prepared in the Study provides a useful basis for the further collaboration among stakeholders to elaborate the plan towards implementation in a timely manner.
- (ii) **Provision of the necessary institutional framework:** TOD is a typical area for policy attention that requires partnership between the public and private sectors. The public sector must ensure the realization of public benefits by preparation of TOD guidelines which specify the roles and responsibilities of both public and private sectors.
- (iii) **Extending the service of the NSCR towards Central and Northern Luzon:** Since the Municipality of Balagtas is expected to play a major role as a multi-modal gateway in Bulacan Province considering its proximity to both the NSCR and the NLEX mainline, consultation between the DOTC and the LGUs is recommended at the earliest opportunity to take advantage of the current availability of the land.

## 3) Conclusions and Recommendations for Tutuban Area Redevelopment

6.6 The Tutuban Station area has exceptional potential among the 10 target the NSCR stations in the study area to play a major role in transportation and urban development. Results of the study clarify the possibility to revitalize the Tutuban area dramatically by the integrated and strategic redevelopment of the Tutuban PNR property including the NSCR and LRT2 stations. Since the Tutuban PNR property is approximately 20 hectare of precious consolidated land in central Manila, Tutuban redevelopment will be a catalyst for the entire urban renewal throughout the City of Manila. To maximize the positive impact of the Tutuban area redevelopment, the following action items are highlighted to be implemented in a timely manner:

- (a) **Planning and implementation of the schedule by taking the construction and operation of the NSCR into consideration:** Redevelopment of Zone 1-A where two Tutuban stations are located is essential as it establishes a gateway to be a catalyst for the redevelopment of the entire Tutuban PNR property and adjacent communities by its multiplier effects. Therefore, the commercial facilities in Zone 1-B need to be constructed by around 2018 to complete the necessary relocation of the existing shops in Zone 1-A. Timely relocation is critical to implement the redevelopment of Zone 1-A by 2020 when the NSCR starts its operation. Relocation of the existing PNR railway facilities, including the station and PNR headquarters, also needs to be implemented prior to the construction of the NSCR as it has conflict with the proposed viaduct of the NSCR. Since deterioration of traffic congestion is expected during

construction of the NSCR, it is important to implement the Dagupan St. widening and development of the station plaza prior to the NSCR construction as an immediate-term project by DOTC.

- (b) **Establishment of implementation structure to accomplish TOD:** As previously described, TOD encompasses a variety of stakeholders and, specifically, the stakeholders of the Tutuban area redevelopment include both the public sector such as the DOTC, the PNR, the DPWH, the MMDA and City of Manila as well as the private sector such as TPI (the developer of Tutuban mall) and Prime Orion (parent company of TPI). In order to coordinate these stakeholders, the DOTC needs to establish the Project Steering Committee as described in **Chapter 5** and commission the necessary consulting services. Once project planning is completed, the DOTC also needs to establish the necessary implementing bodies such as an operation and management agency for the facilities under the NSCR viaduct to maximize the multiplier effects of the NSCR and the Tutuban area redevelopment.
- (c) **Coordination with NSCR South Line:** The study area of the NSCR between Malolos and Tutuban was approved by the NEDA Board in February 2015 as the North-South Railway Project (NSRP) together with the south line connecting to Matnog and Batangas. Since the construction schedule and contents of the south line will affect the NSCR in the study area, in particular the relocation of the Tutuban PNR station, continuous information sharing and coordination will be needed.

6.7 Based on these recommendations, the following steps need to be made in the implementation of the Tutuban area redevelopment:

- (a) **Finalization of Tutuban area redevelopment plan:** While the Tutuban area redevelopment plan proposed by the Study is planned to be adopted as a master plan by the PNR, a Memorandum of Understanding (MOU) for cooperation in the planning of the NSCR and LRT2 Tutuban Station is about to be signed by the DOTC, the PNR, the LRTA, and TPI as of March 2015. Since the MOU clearly states that an agreeable station plan needs to be prepared within six months after signing of the MOU, the DOTC has to take the initiative to (i) establish the Project Steering Committee to reach a consensus among all parties, and (ii) prepare the detailed plan in accordance with the master plan.
- (b) **Implementation of immediate-term projects:** In addition to the formulation of the PPP arrangements for the Tutuban area redevelopment, the DOTC also needs to implement the immediate-term projects (i.e., Dagupan St. widening and development of the station plaza) that are planned to commence construction in the first quarter of 2016. To implement the immediate-term projects in a timely manner, consensus-building among the stakeholders for the demolition of the affected structures is critical.
- (c) **Establishment of necessary redevelopment implementation agencies:** In order to implement the Tutuban area redevelopment by TOD, the development, operation and management agency for the facilities under the viaduct as well as for the public transportation facilities needs to be established in a timely manner, in addition to the Project Steering Committee and the Transaction Advisory Team.

**MAIN TEXT**



# 1 INTRODUCTION

## 1.1 Background and Rationale of the Study

1.1 The population of Metro Manila in the Philippines increased dramatically due to rapid urbanization and had reached approximately 12 million as of the 2010 census, or about 1.5 times its 1990 level of 7.95 million. Metro Manila generates 37% of the country's gross domestic product (GDP) and is the nation's largest economic center. Even though the transportation network in the metropolis has gradually improved through the construction of ring/radial roads, expressways, Light Rail Transit (LRT), Metro Rail Transit (MRT), etc., the serious problem of traffic congestion has not been solved yet. Such congestion prevents efficient logistical movement as well as human mobility, adversely affects economic activities and productivity, and results in significant economic loss and constraints to environmental sustainability.

1.2 Although the Philippine Government has promoted the development of the transportation network based on the urban development plan and the transportation network plan (target year of both plans is 2015) that were formulated through official development assistance (ODA) by the Government of Japan,<sup>1</sup> the transportation capacity is not sufficient to accommodate the drastic population increase in Metro Manila. Consequently, development of a mass transit system in the north-south direction as a core infrastructure axis is absolutely essential to cover the expanding commuter demand. Currently, Philippine National Railways (PNR) operates the commuter line in the southern part of Metro Manila, between Manila City and Calamba City in Laguna Province. This is a non-electrified line with low traffic density and frequency. Meanwhile, railway operation has not been started in the northern part of Metro Manila. Residential areas between Caloocan and Malolos have been expanded without sufficient modes of public transportation. Residents in the area commute to the central Metro Manila area by bus, car, etc. via the highway. As a result, traffic congestion from the highway exit to the central Metro Manila area has become a major issue affecting their commute. Therefore, the development of a mass transit system in this section is urgently required.

1.3 In response to the conditions previously described, the Japan International Cooperation Agency (JICA) is currently implementing various cooperation projects associated with the commuter rail between the suburbs and Metro Manila (see Table 1.1.1). In order to enhance the outcomes of these projects, JICA has decided to provide technical assistance for the planning of transportation facilities and relevant facilities of these projects through the implementation of this Study.

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<sup>1</sup> Metro Manila Urban Transport Integration Study (MMUTIS), JICA, 1999.

**Table 1.1.1 Summary of the NSCR Project**

1. Project Name (Tentative)	North-South Commuter Rail (NSCR) Project <sup>1)</sup>
2. Objectives of the Project	The project aims at expansion of the commuter rail in Metro Manila by the development of the north section between Malolos and Tutuban. Consequently, the project contributes to mitigating the serious traffic congestion and air pollution in Metro Manila.
3. Project Area	(1) Phase 1: Malolos–Caloocan (approx. 31.3 km) (2) Phase 2-A: Caloocan –Tutuban (approx. 5.0 km)
4. Counterpart Agencies	Department of Transportation and Communications (DOTC)
5. Relevant ODA Projects by the Government of Japan	(1) Capacity Enhancement of Mass Transit Systems in Metro Manila Project (Loan Agreement (L/A): March 2013, ODA Loan) (2) Preparatory Survey on Airport Express Railway Project (Commuter Line Section) (May 2013 – November 2014) (3) Preparatory Survey on Metro Manila Central Business Districts Transit System Project in the Republic of the Philippines (October 2013 – May 2015)

Source: JICA Study Team.

1) South line between Tutuban and Calamba has been studied under PPP center separately.

1.4 NSCR project was approved by the National Economic and Development Authority (NEDA) Board in February 2015 as North-South Railway Project (NSRP) together with south line connecting Tutuban, Manila City to Calamba, Laguna Province.

## 1.2 Objectives, Study Area and Counterpart Agencies

### 1) Objectives of the Study

1.5 This Study aims to promote the modal shift to public transportation and integrated development along the railway route by maximizing the effects of the NSCR Project. Achievement of the Study objective contributes to attaining the overall goal of improving the local community in terms of social, economic, and environmental aspects and enabling it to implement sustainable urban development. This objective will be achieved through preparation of the following plans and concept design:

- (i) Concept Plan indicating the general guidelines to implement Transit-Oriented Development (TOD) for all 10 stations in the section of Phase 1 and 2-A of the NSCR Project;
- (ii) Transportation Access Improvement Plan for Tutuban, Solis and Caloocan stations;
- (iii) Station Area Development Concept Design for Tutuban station area including Access Improvement Detailed Plan, Conceptual Design and Integrated Development Plan, as well as assistance for project implementation planning (e.g., bid preparation) by the relevant Philippine government agency such as preparation of Terms of Reference (TOR) for the detailed design of proposed public transportation facilities.

### 2) Study Area and Counterpart Agencies

1.6 The Study area covers both Phase 1 and Phase 2-A of the NSCR Project (see Figure 1.2.1), described as follows:

- (a) **Phase 1:** the section between Malolos and Caloocan (approximately 31.3 km); and
- (b) **Phase 2-A:** the section between Caloocan and Tutuban (approximately 5.0 km).

1.7 The counterpart agencies for this Study are the DOTC and the PNR.



Source: JICA Study Team.

Figure 1.2.1 Study Area



## 1.3 Study Implementation

1.8 The achievement of the Study is briefly summarized below.

- (a) **Task 100 - Preparation in Japan, Presentation and Consultation of Inception Report:** The Inception Report was prepared and submitted on 13 July 2014. The kick-off meeting was held on 30 July 2014 to discuss the study implementation plan and the preliminary findings with JICA, DOTC and PNR.
- (b) **Task 200 - Understanding and Survey of Existing Conditions in Study Area:** Existing data and information such as the Comprehensive Land Use Plans (CLUPs) of local government units (LGUs), road inventory, and land use conditions were collected from the relevant agencies and through subcontracted surveys. Based on the collected information, concept plans for ten stations were formulated (see **Chapter 3**).
- (c) **Task 300 - Assistance for Public Transportation Planning for Access Improvement:** More detailed data related to transportation conditions was collected in Caloocan, Solis and Tutuban areas by subcontracted surveys. The access improvement plan for three stations was formulated after analyzing the information collected from field surveys, key informant interviews, etc. (see **Chapter 3** and **Chapter 4**).
- (d) **Task 400 - Tutuban Station Area Development Concept Design and Assistance for Project Implementation Planning:** Additional surveys were conducted including interview with household and street vendors. Considering the results of these surveys, concept plan and access improvement plan, the TOD concept design for Tutuban Station was prepared. The concept design is composed of development design, development guidelines, preliminary project costs and proposed implementation plan, scheme and schedule. (see **Chapter 4** and **Chapter 5**).
- (e) **Task 500 - Clarification of Issues:** The proposed concept plan, access improvement plan and concept design of Tutuban area were shared with key stakeholders from DOTC, PNR, LGUs, private lessee of the properties around the Tutuban Station, etc. to clarify issues on implementing the plans. The proposed implementation plan addresses the clarified issues and necessary scheme to solve these issues (see **Chapter 5**).
- (f) **Task 600 - Preparation of Draft Final Report:** The Draft Final Report was prepared and submitted on 12 February 2015, including discussions of the results of the abovementioned Task 100 to Task 500.
- (g) **Task 700 – Preparation, Presentation and Submission of Final Report:** The Final Report was prepared, including the comments on the draft final report from JICA. The presentation to DOTC and PNR was implemented.

### 1) Stakeholder Participation

1.9 A series of meetings with various organizations and stakeholders have been carried out to collect available information/data, discuss issues and directions of the study, and share the proposed plan. These include the following:

- (a) **Kick-off Meeting:** This was held on 30 July 2014 to explain the study outline and preliminary findings on the Study area.
- (b) **Presentation to the Provincial Development Council (PDC), Province of Bulacan:**

This was held on 16 December 2014 to explain the proposed concept plans for six stations (Malolos, Guiguinto, Balagtas, Bocaue, Marilao and Meycauayan). Comments from the PDC were only about the NSCR. No comment on the TOD concept plan was made.

- (c) **Technical Working Meeting (with DOTC, Prime Orion, NSCR Study Team, and CBD Study Team):** This was held on 25 September 2014 to discuss the development plan of Tutuban area, especially the Tutuban Mall area. The meeting was organized to share the ideal development plan for the Tutuban area including NSCR and LRT 2 Stations.
- (d) **Individual Meetings with Government Agencies:** In order to understand the current situation of each LGU in the study area and their expectations on NSCR development, individual meetings were held with relevant agencies such as the DOTC, PNR, LGUs (Malolos, Guiguinto, Balagtas, Bocaue, Marilao, Meycauayan, Valenzuela, Caloocan and Manila), National Historical Commission of the Philippines (NHCP), and Pasig River Rehabilitation Commission.
- (e) **Individual Meetings with Other Organizations:** In order to understand the current situation of Tutuban development, individual meetings were held with private companies such as Prime Orion, Tutuban Property Inc., and Sto. Nino De Tondo Manila Management Consultancy Corp. In addition, meetings with some Japanese developers were also held in Japan to explore possible Japanese investments for Tutuban development.

## 2) Supplemental Survey

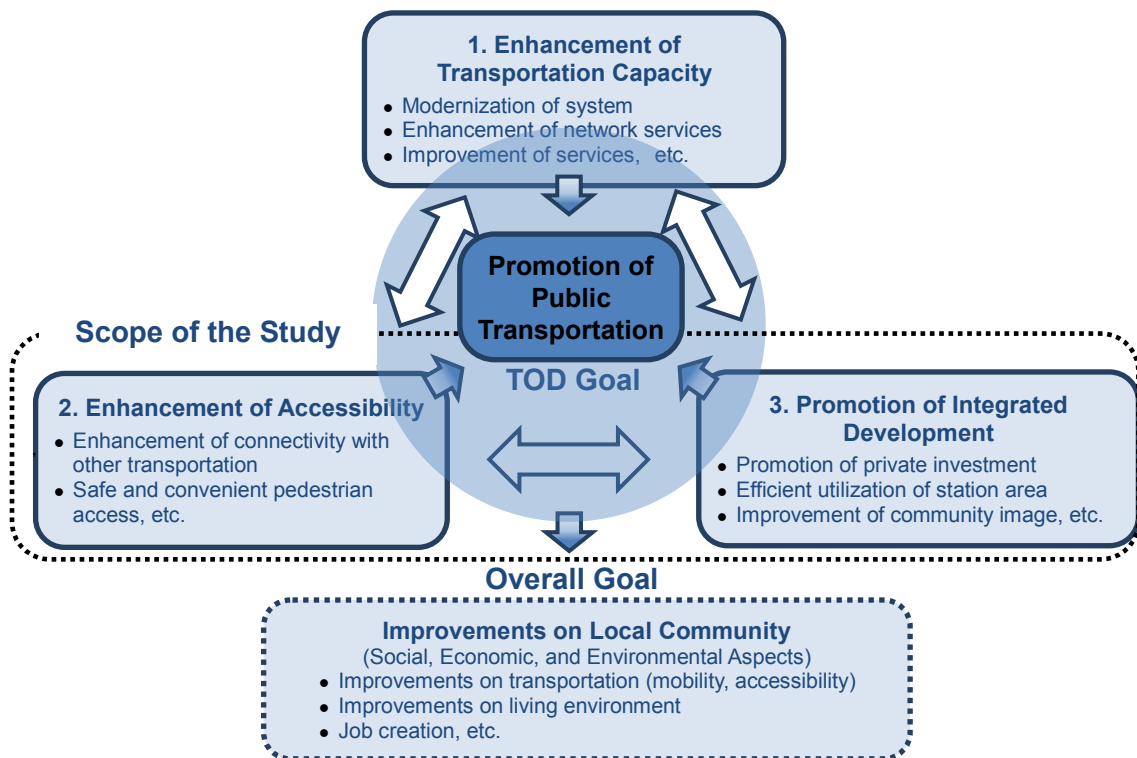
1.10 To collect further information and data, the following supplemental surveys were conducted:

- (a) **UAV Mapping:** This was conducted to prepare the base map of the Tutuban area. The base map includes orthophoto, digital surface model (DSM), digital terrain model (DTM), and topographic maps.
- (b) **Topographic Survey:** Since larger scale base map is more useful for the Caloocan area, a topographic map will be prepared in the same scale as the Tutuban area using Unmanned Aerial Vehicle (UAV).
- (c) **Building and Land Use Survey:** This was conducted to clarify the available lands for TOD development in each station area. The survey included tax mapping, ocular survey, interview survey of relevant agencies, etc.
- (d) **Transportation Survey:** This was conducted to clarify the transport facilities in Tutuban, Solis and Caloocan areas. The survey included the road inventory survey and public transport inventory survey.
- (e) **Household/Street Vendor Interview Survey:** This was conducted to clarify the situation of households and street vendors in Manila and Caloocan areas. The survey was conducted using questionnaires, which also collected information on expectations on NSCR development and TOD.
- (f) **Market Sounding Survey:** This was conducted to clarify the current situation of tenants in the Tutuban Mall and trends among shoppers in shopping malls in Metro Manila. This was conducted as a questionnaire survey.

## 2 CONCEPT OF TOD AND INTEGRATED DEVELOPMENT

### 2.1 Concept and Objectives of TOD

2.1 Transit-Oriented Development (TOD) is a development approach that primarily aims to promote public transportation with the multiplier effects through the integration of transportation development and other types of development such as commercial, office, and residential development. Such integration enables the creation of a multi-functional, convenient and vibrant space around the transit nodes (stations) which attracts more passengers. Consequently, TOD stimulates the growth of public transportation and contributes to improvement of the local community in terms of social, economic and environmental aspects (see Figure 2.1.1).



Source: JICA Study Team.

**Figure 2.1.1 Concept of TOD**

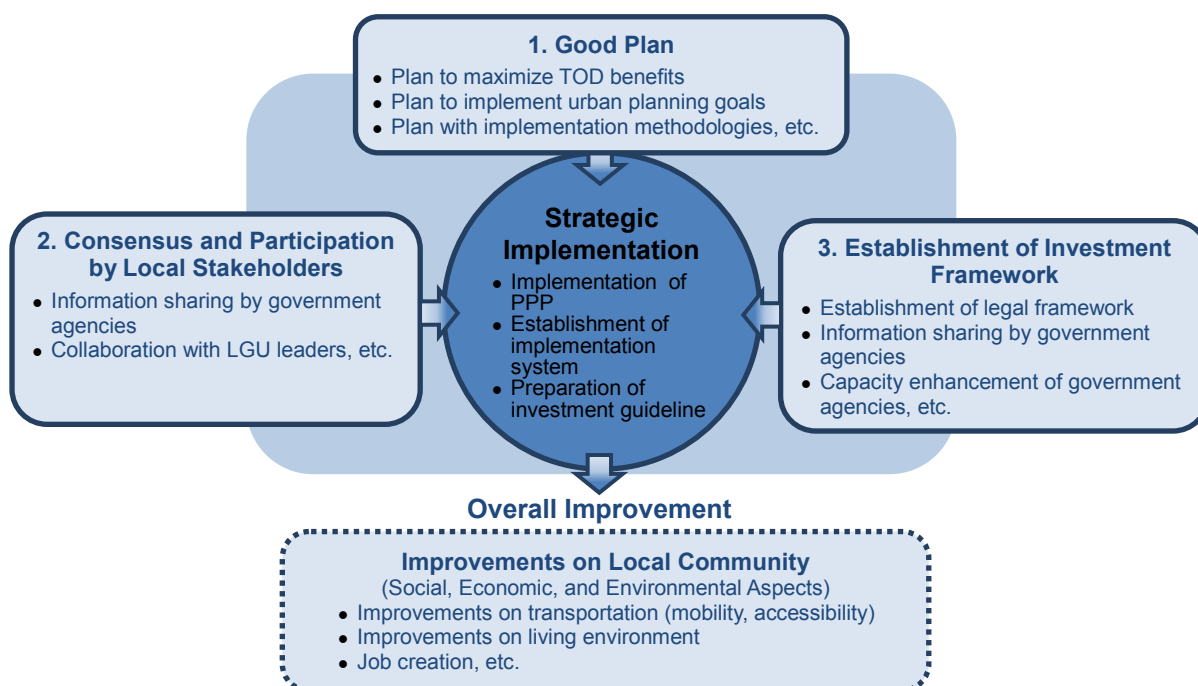
2.2 Generally, many cities in developing countries that plan to introduce urban railway for the first time do not fully understand TOD and its importance, unlike in Japan where many cities have been implementing TOD since their initial stage of railway development. Metro Manila is not an exception. Lacking TOD for the current urban railways such as Light Rail Transit (LRT) and Philippine National Railways (PNR) causes congestion. Consequently, insufficient TOD significantly impedes their transportation functions and prevents optimization of economic development opportunities.

2.3 As Figure 2.1.1 shows, the enhancement of transportation capacity and accessibility as well as the promotion of integrated development are essential to implementing successful TOD that contributes to promotion of public transportation. In order to maximize the benefits and positive impacts of the North South Commuter Rail (NSCR), this Study explored the opportunity for enhancing accessibility and integrated development through TOD.

## 2.2 Approach to Implementation of TOD for NSCR

2.4 Since enhancement of transportation and access as well as implementation of integrated development encompass many projects that cannot be implemented simultaneously, phased planning needs to be considered and executed based on the long-term vision. Transportation capacity and safe and convenient access need to be secured by the time transit operation starts, while integrated development can be implemented gradually according to the needs of the local community as well as the development plans in the adjacent areas. As previously mentioned, accessibility and integrated development are the focus of this Study.

2.5 TOD also requires practical coordination and consensus building among various stakeholders to ensure participation, and secure rights and legal permits for its planning and project implementation. In addition, appropriate investments need to be carried out according to the development plan. The development plan should be feasible and responsive to the needs of the stakeholders (see Figure 2.2.1).



Source: JICA Study Team.

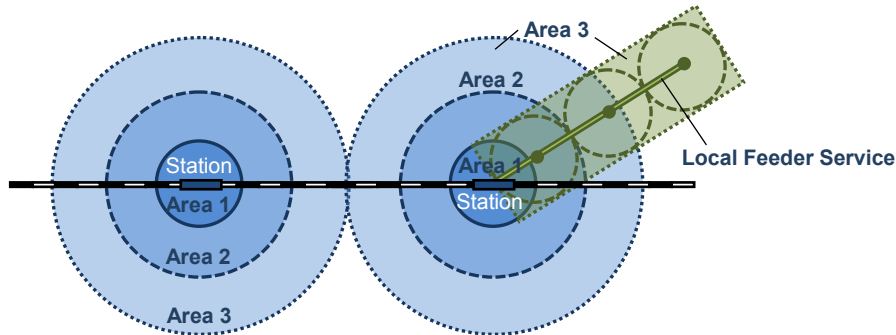
**Figure 2.2.1 Conceptual Approach for Strategic Implementation of TOD**

2.6 In addition to considering the timeframe, stakeholder consultations, and establishment of the framework for investment, the spatial analysis also needs to be conducted in a particular manner for the planning of TOD. The station's influence area (catchment area) is commonly used to delineate the study area for TOD. As shown in Figure 2.2.2, the influence areas are characterized according to the distance from the station. In this Study, the influence areas are defined as follows:

- Area 1 (Transit Core):** Station area (200 m from the station) where the impact of the transit is the most significant in terms of both transportation and other urban development.
- Area 2 (Transit Neighborhood):** Walkable area from the station that is accessible on foot or with other supplemental assistance such as bicycle and

shuttle service. Although walkable distance is usually defined as around 1 km, it can be currently shorter in Metro Manila due to the lack of safe pedestrian access.

- (c) **Area 3 (Transit Supportive Area):** Potential catchment area accessible by local feeder transportation such as bus and jeepney. Accessible distance from the station can vary according to the development in the local community. Sufficient local feeder transportation services are especially critical to maintain a sound transit supportive area.

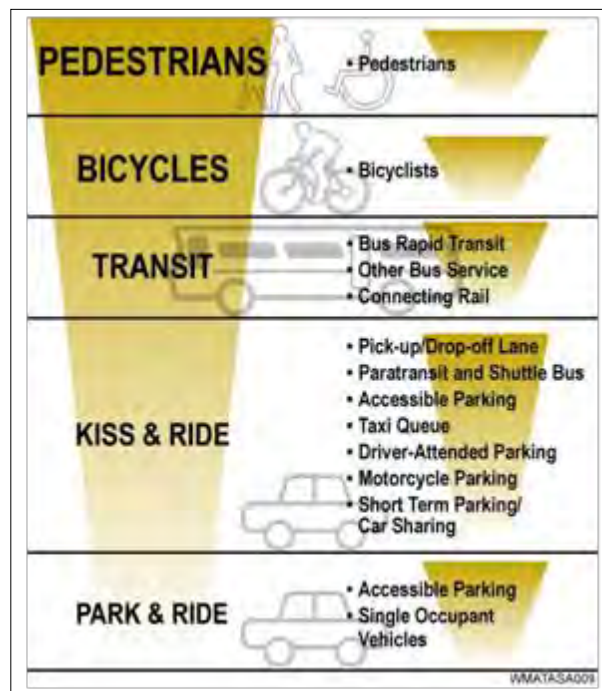


Source: JICA Study Team.

**Figure 2.2.2 Areas of a Station's Influence for this Study**

### 1) Enhancement of Accessibility

2.7 Accessibility for pedestrians should be highly considered especially near the station area (Areas 1 and 2 in Figure 2.2.2). One of the basic principles of TOD is to secure safe and convenient access for the pedestrians and discourage the influx of private vehicles into the station area. Figure 2.2.3 presents the typical hierarchy of the access mode in these areas.



Source: Station Site and Access Planning Manual, Washington Metropolitan Area Authority (2008).

**Figure 2.2.3 Access Hierarchy**

2.8 In order to implement universal access for all commuters, considerations for the elderly people and persons with disabilities or special needs have to be integrated in the design. Such considerations are not sufficient in the current pedestrian access to the existing stations in Metro Manila.

## **2) Promotion of Integrated Development**

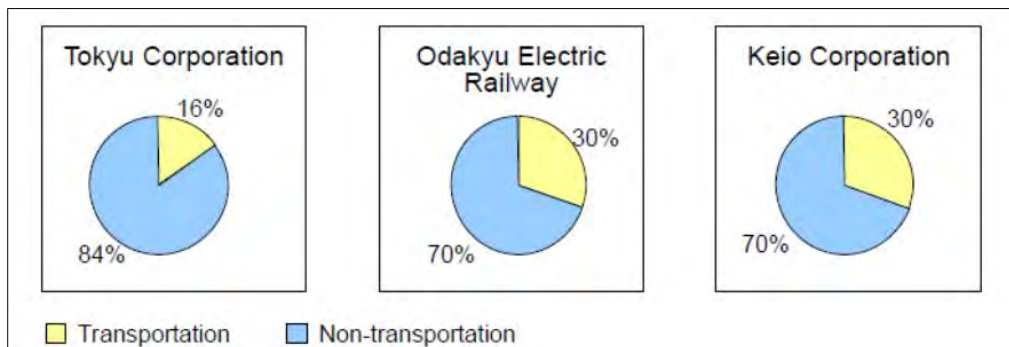
2.9 The private sector plays a significant role in infrastructure development in the Philippines, where public-private partnership (PPP) projects such as roads, airport and water supply systems have been implemented utilizing private financial and technical resources. So far, only one PPP project (Metro Railway Transit 3 (MRT 3)) has been implemented among the railway projects by Built-Lease-Transfer (BLT). RA 6957 on the Implementation of Infrastructure Projects by the Private Sector, or commonly called the Build-Operate-Transfer (BOT) Law, regulates PPP for infrastructure development and, as its name implies, only covers PPP by BOT modes including BLT and Rehabilitate-Operate-Transfer (ROT). Due to the high flexibility given to private sector partners in BOT projects, the relevant government agencies have to take initiative and control the projects to ensure public benefits and quality of services. However, most government agencies do not have a system to evaluate and manage PPP projects. As of 2010, only the Department of Public Works and Highways (DPWH) had a specialized PPP office within the department. Since PPP is the effective method to implement integrated development in TOD, a PPP implementation scheme including institutional capacity enhancement needs to be established based on consultations with the government agencies concerned such as the Department of Transportation and Communications (DOTC), PNR, and Light Rail Transit Authority (LRTA).

2.10 Although the PPP Center (formerly the BOT Center) was created in 2010 by Executive Order No. 8 under the National Economic and Development Authority (NEDA) as a national clearinghouse for PPP projects, the Center has been fairly active in promoting the PPP projects. Nevertheless, private companies still play a dominant role in infrastructure investment with little or no government prodding. Thus, private companies have invested mainly through their own initiatives, with little or no government prodding. With the mainly public nature of infrastructure development, investment guidelines need to be prepared to control development by the government to secure the public fairness, to redress an imbalance in the ratio of investment by the big conglomerate and to provide opportunities for all private companies to encourage more private sector participation. Such initiatives would allow local small and medium enterprises (SMEs) to take part in TOD and stimulate local economies. Capacity development and enhancement for the relevant government agencies is also required for the formulation and implementation of these guidelines.

2.11 Likewise, capacity development is necessary to establish the system for urban planning to implement TOD through integrated development. Since the master plan is usually formulated with a long-term vision (10–20 years), it is possible to become inconsistent with current economic and social conditions such as population and economic growth. Therefore, consideration of the timeframe is essential and the implementation plan (rolling plan) needs to be prepared to conduct any necessary re-zoning and re-development but maintaining the fundamental concept of the master plan. The BOT Law was amended in 1994 to include unsolicited projects proposed by private companies, in addition to the regular solicited projects by the government. However, as

consistency with urban planning has not been included in the criteria for unsolicited projects, relevant government agencies have to evaluate the proposed unsolicited PPP projects in that regard. Unfortunately, such necessity has been neglected and an evaluation system as well as implementation system for urban planning have not been established yet. Since there are no laws and regulations specific to TOD in the Philippines, the legal framework also needs to be established to control various development TOD projects in a systematic manner. The implementation scheme for TOD is proposed in **Chapter 5.3**.

2.12 Another important aspect that needs to be highlighted for successful integrated development is land acquisition. Railway authorities usually tend to focus on acquisition of right-of-way (ROW) only, but sufficient land also needs to be secured for public transportation facilities such as station plaza and jeepney terminal in order to implement successful TOD. In Japan, many railway companies (especially private railway companies) have invested in large-scale residential and commercial development along their railways. Such investment becomes a major source of revenues for the companies and supports their sustainable railway operation and management (see Figure 2.2.4). In the Philippines, the Local Government Units (LGUs) need to play an important role in implementing integrated development to systematically control developments by the private sector. Since the sustainability of TOD largely relies on public involvement, including the social and environmental considerations, the LGUs need to guide the private sector to include such considerations in their plans. Therefore, consultation among stakeholders is essential to sharing the development vision at the initial stages of TOD planning.



Source: Japan International Consultants for Transportation Co., Ltd.

**Figure 2.2.4 Sources of Revenue for Japanese Private Railway Companies**

2.13 In the Philippine setting, TOD offers an opportunity to mitigate the issues regarding the informal settlement families (ISFs). The NSCR will enable people to travel between Malolos and Tutuban in about half an hour. It follows that the commutable area will be expanded and potential relocation site will be increased accordingly. The shorter travel time and increased access to employment, business, leisure and social services along the route will lessen the risk of the relocated ISFs going back to Metro Manila.

### 3) Enhancement of Management System

2.14 Access improvement cannot be implemented solely through the physical improvements such as road widening. Traffic management is also required to control the transportation system in a safe, convenient and sustainable manner. In Metro Manila, control of on-street parking and street vendors is necessary to mitigate congestion by securing the sufficient road width for the smooth traffic flow. To enhance traffic

management, coordination among the relevant government agencies such as DPWH, Metro Manila Development Authority (MMDA), LGUs, and local communities such as the barangays will be needed.

2.15 As previously mentioned, TOD has significant potential to open up various business opportunities through integrated development. They range from large-scale residential development along the railway to small-scale commercial development under the viaduct. To take advantage of these business opportunities to sustain railway operation, the railway company needs to have the leadership to involve the private companies as well as the relevant LGUs through the establishment of the appropriate management system in addition to their regular operation and management (O&M) system.



## 2.3 Good Practices of TOD

2.16 Japan has a long history of railway transportation and many successful TOD cases for access improvement and integrated development around the railway stations. The PPP schemes enable to utilize the private sector's experiences and resources to develop public facilities for access improvement as well as to implement the integrated development with the surrounding areas. Since Japan has many successful TOD projects implemented by PPP, similar approach can be applied for the implementation of TOD projects in the Philippines.

### (1) Pedestrian Deck Project of Shiodome Station

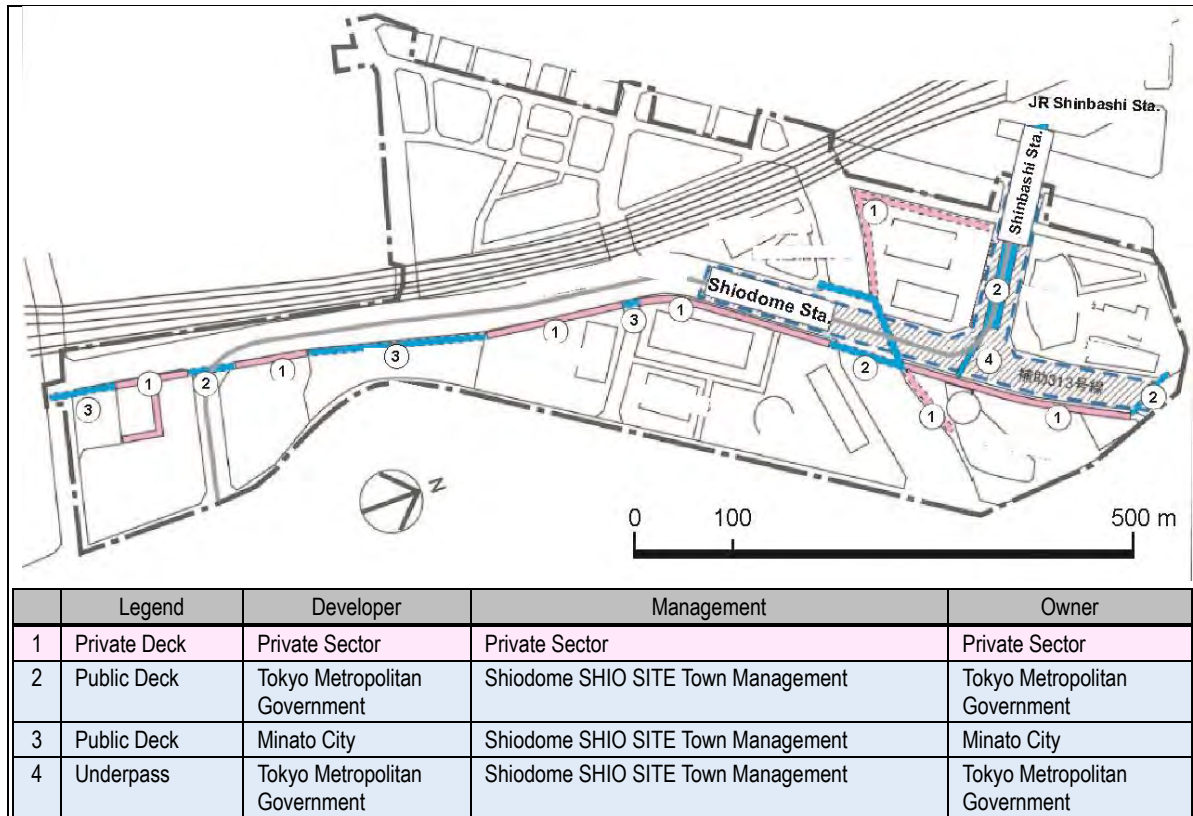
2.17 One of the effective ways to improve accessibility in the urban area with limited land availability is to provide the access in the multiple layers like a pedestrian deck. A pedestrian deck connecting the station to the surrounding area can separate vehicular flow and pedestrian traffic for greater safety and convenience. The pedestrian deck at Shiodome Station in Tokyo is a successful example constructed by one of the PPP schemes named land readjustment project.

2.18 One of the major objective of the land readjustment project is to develop necessary public infrastructure such as parks and roads to improve the quality of the neighborhood. In the case of Shiodome Station land readjustment project, the Shiodome Town Council was founded at the initial stage by the private sector including land owners and business operators and the public sector (Tokyo Metropolitan Government and Minato City Government) to prepare a plan for the entire project area. Public facilities were constructed in accordance with the plan. Project costs were shared among the stakeholders. Respective private building operators paid for the sections attached to their buildings and public sector paid for the reminder (see Figure 2.3.1). Management cost has been shared in a similar manner as shown in Figure 2.3.1. Since the pedestrian deck connects two stations similar to the proposed Tutuban stations (see Figure 2.3.1), and has contributed significant access improvements especially for the transfer, it can be referred in terms of both design and implementation scheme.

**Table 2.3.1 Profile of Shiodome Land Readjustment Project**

Item	Description
Project Name	Shiodome Land Readjustment Project
Location	Shiodome Station (Tokyo Waterfront New Transit Waterfront Line(Yurikamome), Toei Oedo Line), Tokyo
Characteristics	Large scale redevelopment by PPP at a former freight train depot and surrounding area
Area	30.7 hectare
Project Cost	JPY146.3 billion shared by Tokyo Government, Minato City and private sector
Facilities	<ul style="list-style-type: none"> <li>- Station plaza: 2,522 sq.m</li> <li>- Two parks: 4,641 sq.m in total</li> <li>- Extension of roads with 6 to 16 m width: 1,703 m in total</li> <li>- Extension of roads with 16 to 40 m width: 2,171 m in total (75,107 sq.m)</li> <li>- Pedestrian deck (about 2 km) and pedestrian path at the ground level</li> </ul>
Planning	Shiodome Town Council was founded by landowners, business operators, Tokyo Metropolitan Government and Minato City to prepare a plan for the integrated redevelopment.
Implementer	Tokyo Metropolitan Government
Operator	Shiodome SHIO SITE Town Management (landowners' corporation founded by all landowners of the redevelopment project area) Yearly running cost: JPY300 million (shouldered JPY100 million each by Tokyo Metropolitan Government, all landowners (1,555 owners), Town Management income source (e.g., advertising)

Source: Case studies for development of pedestrian walkway by public private partnership, Organization for Road System Enhancement.



Source: Case studies for development of pedestrian walkway by public private partnership, Organization for Road System Enhancement.

**Figure 2.3.1 Map of Pedestrian Deck at Shiodome Station**



**Entire Area of Shiodome Shiosite (Redevelopment Area)**

**Pedestrian Deck between Shiodome Station and Yurikamome Shinbashi Station**

Source: Shiodome SHIO SITE Town Management, <https://seidenpriester.wordpress.com/tag/pedestrian-deck/#jp-carousel-4707>

**Figure 2.3.2 Images of Shiodome Shiosite and Pedestrian Deck Connecting Stations**

### (2) Redevelopment Project of Shinagawa Station

2.19 Another good case study of land readjustment project for the access improvement is Shinagawa Station area redevelopment as it also includes the integrated development component (see Table 2.3.2). In this case, the development strategy and plan were developed by an Academic Council which was founded by the public and private stakeholders including the landowner, railway company, Tokyo Metropolitan Government, Minato City, Shinagawa City, Japanese National Railway Settlement Corporation, JR East, etc. Shinagawa Station area redevelopment including the land readjustment project was

implemented in accordance with the prepared plan.

2.20 Under the land readjustment project, the basic transport infrastructure such as a station plaza, extension roads, parks, a basement car park, public open spaces and a pedestrian walkway were constructed. The public sector shouldered 31% of the total cost, which was financed by the revenue from the sales of the reserved land, and the private sector paid for 66% of the cost, with the remaining 3% from other sources. Due to the significance of the connection between the east and west side of the station, the Shinagawa Station Road Construction Council was founded by Minato City and all the private companies in the land readjustment area to develop an appropriate pedestrian access. Cost sharing was a major topic among stakeholders from the initial stage of the planning because of the large amount of the construction cost for the pedestrian walkway including the pedestrian deck (JPY16 billion). As a result, it was decided that JR Central and JR East paid 10% of the cost of the pedestrian walkway, and the Shinagawa Station Road Construction Council paid 90%.

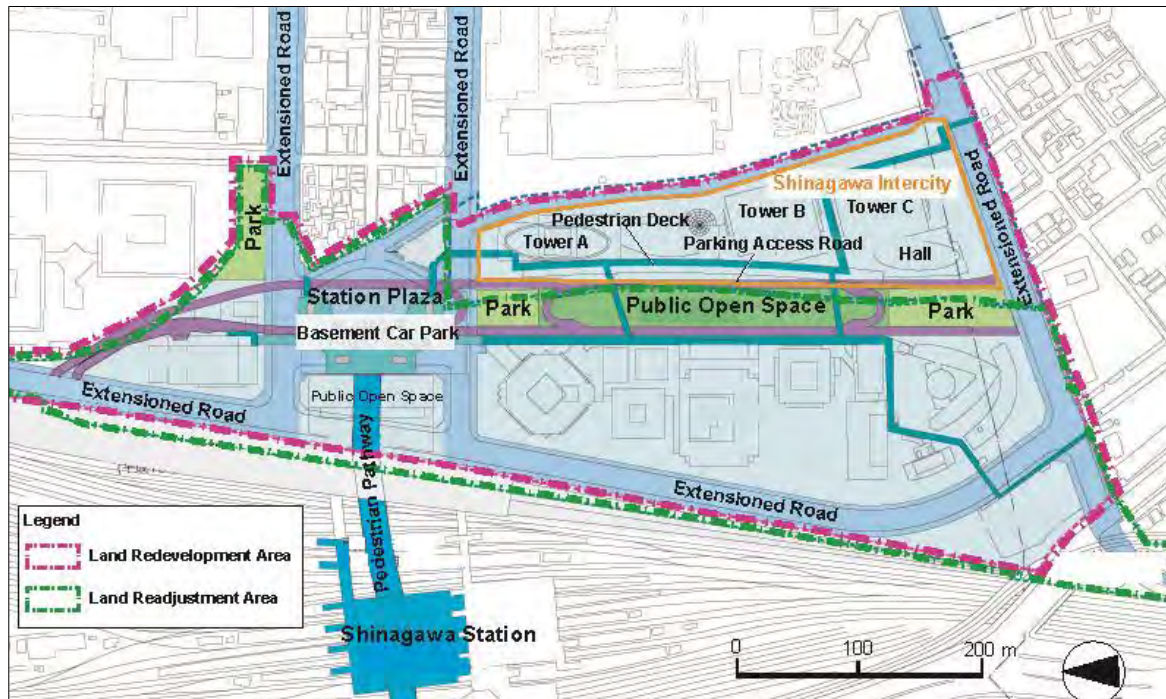
2.21 In addition to the improvements on the accessibility, the public facilities built by the land readjustment project provide the multiplier effects to implement the integrated development by inviting other redevelopment project solely by the private sector. Shinagawa Intercity shown in Table 2.3.2 is one of the example. Shinagawa Intercity has three high-rise mixed use buildings and contributes to the local community as well as to the visitors. In order to manage the common public facilities in Shinagawa Intercity, Shinagawa Intercity Management Corporation was founded by the private sector stakeholders. This implementation scheme for large-scale integrated development at Shinagawa Station area can also be a reference for the Tutuban area redevelopment.

**Table 2.3.2 Profile of Shinagawa Station Land Readjustment and Redevelopment Project**

	Item	Description
Overview	Project	JR Shinagawa Station Land Readjustment Project and One of the Redevelopment Project Case “ Shinagawa Intercity”
	Location	Shinagawa Station(JR Yamanote Line, JR Tokaido Main Line), Tokyo
	Characteristics	After the land readjustment project in the former railway depot, several redevelopment projects were completed in the area
Land readjustment	Public Facilities	Station Plaza: 2,520 sq.m, road extension, three parks (4,600 sq.m), basement parking, public open spaces (1 hectare), pedestrian walkway
	Area	13.7 hectare (past a freight depot)
	Landowner	- Original landowner: Japanese National Railway Settlement Corporation (8.6 hectare) and others - New landowner: Nippon Steel Kowa Real Estate, Central Japan Railway Company (JR Central), Mitsubishi Corporation, Daito Trust Construction Co., Ltd, Taiyo Life Insurance Company, Mitsubishi Heavy Industries, Ltd., JR East, NTT Data Corporation, etc.
	Cost Sharing	- Total project cost: JPY 35 billion Public sector (from revenue from the sale of the reserved land): 31.1%;Private sector: 65.7%;Others: 3.2% - Example of cost sharing: Pedestrian walkway (width 20 m, length 250 m):JPY16 billion JR Central and JR East: 10%; Shinagawa Station Road Construction Council: 90%
	Planning	Academic Council for Shinagawa Station Basement Planning was founded by order from Tokyo Prefecture, Minato City, Shinagawa City, Japanese National Railway Settlement Corporation, JR East etc. to design the integrated plan.
	Developer	Japan Railway Construction, Transport and Technology Agency
Shinagawa Intercity (one of the re-development)	Facilities	Three commercial and business office buildings, one commercial hall. Tower A: 32 floors, Tower B: 31 floors, Tower C: 31 floors, Tower D: 5 floors (shops and restaurants)
	Area	Ground area: 3.5 hectare, total floor area: 33.7 hectare
	Developer	Nippon Steel Kowa Real Estate, Sumitomo Life Insurance Company, Obayashi Corporation

	Item	Description
projects)	Constructor	Joint venture of Obayashi Corporation, Shimizu Corporation, Kajima Corporation, Haseko Corporation
	Operator	Shinagawa Intercity Management Corporation

Source: JICA Study Team compiled from several sources like Tokyo Prefecture's official website.



Source: JICA Study Team based on Tokyo Prefecture's official website.

**Figure 2.3.3 Shinagawa Station Map**



**Entire Area of Shinagawa Station Area**

**Station Plaza**

**Public Open Space and Shinagawa Intercity**

Several: Shinagawa Intercity Management Co.TokyoLtd. website, Winriver Corporation website.

**Figure 2.3.4 Images of Public Facilities at Shinagawa Station Area**

**(3) Community Improvement Using Space Under Viaduct at Asagaya Anime Street**

2.22 To implement the integrated development, utilization of the space under a viaduct is an efficient and effective approach to maximize the benefits of the railway project. Since NSCR is proposed to have an elevated structure for the entire section from Malolos to Tutuban, the space under the viaduct can be utilized for transport, commercial and public facilities. Utilization of the space under the viaduct also prevents the dead spaces causing the increase of crime rate in addition to generate sufficient revenue to sustain railway operation. Recent development projects under the viaduct in Japan became a catalyst for the community improvement. One such case is Asagaya Anime Street in Tokyo, where

commercial shops in the pre-fabricated simple structure are located under the railway viaduct (see Figure 2.3.5). As the area is famous for the animation production industry, the tenants are local animation companies (see Table 2.3.3). These shops improve the recognition of the area, bring more visitors and provide multiplier effects to stimulate local economy. Similar approach is applicable for NSCR stations to introduce the shops relevant to the local business and commercial activities.

**Table 2.3.3 Profile of Asagaya Anime Street**

Item	Description
Project Name	Asagaya Anime Street
Location	JR Chuo Line between Asagaya Station and Koenji Station, Tokyo
Facilities	Commercial and communication facilities under the JR East railway viaduct from Koenji Station to Asagaya Station
Characteristics	Local shops which represent the “Anime” related business in the area
Cost, Investors	- Construction cost: JPY228 million by Higashinohon Toshikaihatsu Co., Ltd. (the company is 100% invested by JR East) - Interior finishing work: by each tenant
Developer	Higashinohon Toshikaihatsu Co., Ltd.
Constructor	Suzuki Koumusho Co., Ltd.
Operator	Higashinohon Toshikaihatsu Co., Ltd.
Landowner	JR East
Area	2,155 sq.m (Pathway: 1,675 sq.m (100 m length), Tenants space: 480 sq.m) 15 separated zones, average floor area: 32 sq.m/zone (anime goods shops, small theatre, event gallery, cafe)
Earnings	Monthly earnings: JPY3,300–3,600/ sq.m
Payback Period	9 years

Source: JICA Study Team compiled from several sources such as Yelp website.



Source: Yelp website.

**Figure 2.3.5 Images of Asagaya Anime Street**

#### **(4) Public Facilities Under Viaduct at Shakuji Park Station**

2.23 The space under the viaduct can also be utilized for transport and public facilities especially in the urban area where availability of the land is limited. An intermodal facility is necessary around the station for transferring between the train and local/regional feeder services. Shakuji Park Station in Tokyo has several parking spaces under the viaduct. Public facilities such as a nursery school and several commercial shops are located under the viaduct as well (see Table 2.3.4 and Figure 2.3.6). These facilities were developed by the subsidiary agency of the railway company to secure the revenue generated by these facilities for the railway operation. In order to implement the sustainable railway operation, similar approach is applicable for NSCR stations without sufficient available space for transport and public facilities.

**Table 2.3.4 Profile of Shakuji Park Station Development**

Item	Description
Project Name	Shakuji Park Station Area Development "Eminard Shakuji Park"
Location	Shakuji Station (Seibu Ikebukuro Line), Tokyo Prefecture
Facilities	Using Seibu railway viaduct for public transport facility - Parking: 1,287 bicycle slots, 39 car slots, 29 motorcycle slots - Life support facility (nursery school, dispensing pharmacy, pet hospital and hotel) - Commercial (supermarket, restaurant, café, grocery shop, bakery, flower shop, clothing shop, etc.)
Investor	Seibu Properties, Inc.
Developer	Seibu Properties, Inc. (Seibu Railway Company Co., Ltd. owns 29.1% of the stocks)
Constructor	Designed by Tokyu Architects & Engineers Inc., Constructed by Seibu Construction Co., Ltd. (Seibu Railway Co., Ltd. owns 100% of the stocks)
Operator	Seibu Properties, Inc.
Land owner	Seibu Railway Co., Ltd.
Area	8.2 hectare

Source: JICA Study Team compiled from several sources like Seibu Properties Inc. website.



Source: Several sources such as Seibu Properties Inc. website.

**Figure 2.3.6 Images of Under Viaduct at the Shakuji Park Station**

## 2.4 Regional Characteristics and Issues of the Project Area

2.24 The project area covers six cities/municipalities in the Province of Bulacan, Region III and three cities in Metro Manila. Region III and Metro Manila are the part of the Greater Capital Region (GCR) which currently serves as the premier metropolis of the Philippines.

2.25 Metro Manila is relatively small in terms of land area (620 sq.km or only 0.2% of the country) but it accounted for 13% of the country's population and 36% of the Gross Domestic Product (GDP) in 2010. On the other hand, Region III has a large area of 22,015 sq.km but shares 11% of the total population and only 9% of the GDP in 2010 (see Table 2.4.1). However, the population of Region III, especially the Province of Bulacan, has increased rapidly. The impact of urbanization in Metro Manila can already be seen outside the metropolis.

**Table 2.4.1 Development Profile of Metro Manila, Region III and the Philippines**

Indicators			Metro Manila	Region III	Philippines	
Area (sq.km)			620	22,015	343,448	
Population	No. (000)	2000	9,933	8,205	76,507	
		2010	11,858	10,138	92,338	
	AGR (% per year)		2000- 2010	1.79	2.14	1.90
	Density (persons/hectare)	2000	160.2	3.7	2.2	
2010		191.3	4.6	2.7		
Economy	GRDP (PHP billion @ 2000 price)		2000	1,113	327	3,916
			2010	2,043	514	5,702
	AGR (% per year)		2000- 2010	6.26	4.64	3.83
	Per Capita GRDP (PHP 000/person @ 2000 price)	2000	112	40	51	
2010		172	52	62		
Labor	No. of Employment (000)		2000	3,543	2,730	27,775
			2010	4,373	3,717	36,035
	Sector Share: Primary/Secondary/Tertiary (%)		2000	1.0/ 24.6/ 74.4	25.0/ 23.2/ 51.8	37.8/ 15.6/ 46.5
			2010	0.6/ 19.3/ 80.2	21.6/ 19.2/ 59.2	33.7/ 14.4/ 51.8
	Unemployment Rate (%)		2008	13.9	9.2	7.4
			2012	11.2	0.5	7.2
	Underemployment Rate (%)		2008	11.8	8.7	19.3
2012			14.4	11.6	18.8	
Household Income and Expenditure	Average Family Income (PHP/year @ 2000 price)		2006	221	147	125
			2009	227	127	107
	Average Family Expenditure (PHP/year @ 2000 price)		2006	183	139	129
			2009	197	119	110
Poverty	Poverty Incidence Estimates (%)	Among Families	2009	2.4	10.7	20.5
			2012	2.6	10.1	19.7
		Among Population	2009	3.6	13.7	26.3
			2012	3.9	12.9	25.2
	Magnitude of Poor Estimates (000)	Families	2009	64	233	4,037
			2012	77	240	4,215
		Population	2009	403	1,329	23,300
			2012	461	1,340	23,746

Source: National Statistics Office (NSO), National Statistical Coordination Board (NSCB).

## 1) Physical Background and Hazard Risks

2.26 Region III is located on the Luzon Central Plain, which is a large flat territory. This region is bordered by Cagayan Valley to the north, Metro Manila, Region IV-A and Manila Bay to the south, the West Philippine Sea to the west, and the Philippine Sea to the east. Metro Manila also has a basically flat terrain, bordering by the Manila Bay on the west, tidal flats extensively developed into fishponds on the northwest, the Central Luzon Valley on the north, the foothills of the Sierra Madre mountain range on the northeast and the east, Laguna de Bay on the southeast, and a narrow neck of flat land on the south.

2.27 As the Philippines is known as one of the countries with the most active tectogenetic movement, the northeast border of the Luzon Central Plain is a major fault in the Philippines in a southeast-northwest direction, passing through Luzon Island. In 1990, a magnitude 7.8 earthquake was caused on Luzon Island by this fault. Another fault line is the West Marikina Valley Fault, about 15–20 km away (southeast) from the starting point of the NSCR, which caused a magnitude 6–7 earthquake in 1853. Region III and Metro Manila are exposed to the secondary disasters of earthquakes such as tsunami, flood and liquefaction.

2.28 Flood is caused not only by earthquakes but also by rains. The Pampanga Delta, occupying the northern coastline of Manila Bay and extending from Orani, Bataan in the east to the Caloocan-Malabon-Navotas-Valenzuela (CAMANAVA) Area of Metro Manila to the west, is a highly flood prone area. About 25% of the entire deltaic area is under permanent flooding condition, and 12% is subjected to prolonged and deep flooding during the rainy season. In addition, approximately 24% of the area including deep fine textured soils located on the low alluvial plain, has poor natural drainage. The lower lying areas, including urban areas of Metro Manila, are also subjected to prolonged flooding. Aside from its geographical conditions, the poor drainage system and its lack of proper management have caused flooding in the urban areas.

## 2) Population Growth and Congestions

2.29 Since Metro Manila has been the center of the economy and development in the Philippines, the area has attracted more and more people. The population of Metro Manila increased to about 12 million as of the 2010 census. Its population density is already more than 190 persons/hectare but continues to get denser with its 1.2% annual population growth rate. The population congestion of Metro Manila accelerates the expansion of existing urban areas unto the outer areas beyond Metro Manila. The population growth in Region III, especially the Province of Bulacan, has accelerated as well as Region IV-A. Today, the actual metropolitan area extends to the adjoining provinces of Bulacan, Rizal, Laguna and Cavite (BRLC). Many people reside in these peri-urban areas and commute to Metro Manila. By 2030, the population of these areas will exceed that of Metro Manila and Mega Manila will become one of the largest urban areas in the world with a total population of 30 million.<sup>1</sup>

2.30 The combination of high population density and rapid urban expansion has resulted in a poor living environment in many areas in the metropolis. Poverty and a lack of affordable housing have forced many to live in slum/squatter areas and informal settlements where disaster risk is high (e.g., along waterways). Those people cannot access appropriate public facilities and social services. In addition, economic loss of

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<sup>1</sup> Estimated by the National Statistical Coordination Board (NSCB)



society from traffic congestions has become a serious problem in Metro Manila. Development of transport infrastructure cannot catch up with the demands of rapid population growth.

### **3) Economic Development and Poverty**

2.31 It is clear that Metro Manila functions as a leading economic center of the Philippines and economic development is highly concentrated in this area. In 2010, the Gross Regional Domestic Product (GRDP) of Metro Manila accounted for 36% of the Gross Domestic Product (GDP), with an annual growth of 6.3% in the period of 2000–2010. Per capital GRDP of Metro Manila in 2010 was PHP 172,000, which was almost thrice the national average. In contrast, Region III's GRDP contributed only 9.3% to the GDP, and its per capita GRDP was even lower than the national level. In general, employment by economic sector is similar to the sector share of GRDP. The number of persons employed in the tertiary sector (services) tends to increase over all regions. The higher share of the tertiary sector (80%) in Metro Manila has contributed to economic development. Since Region III is considered the "Rice Granary of the Philippines", the region has a relatively higher share (22%) of the primary sector (agriculture).

2.32 Because population is highly concentrated in Metro Manila and its surrounding areas, not enough jobs are created at the same pace as people reaching productive age. The unemployment rates in Metro Manila (11%) and Region III (10%) are much higher than the average for the country (7%). However, unemployment in these areas has gradually decreased through the years with the expansion of industries and businesses.

2.33 Consonant with their economic development, the average annual income and expenditure of families in Metro Manila and Region III were higher than the national average. Income and expenditure levels in Metro Manila were way above those in Region III. Similarly, poverty incidences of families and populations in Metro Manila were 2.6% and 3.9%, respectively, in 2012, significantly lower than the national averages. The same is true for Region III though on a lower level (family and population poverty incidences of 10.1% and 12.9%, respectively).

2.34 Although Metro Manila recorded a very low poverty incidence, there were 556,500 ISFs in 2010, an increase from 544,600 in 2007. Of these families, about 20% lived in the danger areas such as flood prone areas along waterways. Due to the economic and urban development of Metro Manila, people come to seek better job opportunities and living environment. However, many unfortunately have to face the grim reality of inadequate affordable housing, lack of job opportunities, and poor living conditions.

### **4) Spatial Development and Urbanization**

2.35 The vast areas of Region III are mainly used for agriculture. The region's land use has two major land classifications, namely: Alienable and Disposable (A&D) and Forest. About 11,900 sq.km are classified as A&D while 9,500 sq.km are forest lands. The vast agricultural lands currently cultivated lie at the central portion of the region, constituting mostly the flatlands of Nueva Ecija, Tarlac, Pampanga and Bulacan. The region also has 2,642 sq.km of forage and pasture areas for livestock production, with Bulacan, Nueva Ecija and Zambales having the biggest shares. Lands in the Pampanga Delta area are devoted to fishpond development. Forests provide a rich source of ecological goods and services significant to development while contributing to maintaining the level and availability of groundwater resources as well as in stabilizing surface water flow, which

avert or mitigate erosion, sedimentation of waterways, and flooding.

2.36 The land use situation of Metro Manila has been changing since 1996. Most notable is the heightening of commercial activities and intensifying of residential lands. There has been land conversion from military bases and open lands and reclamations in the western portions at the coastal areas specifically for these land uses. A significant portion of agricultural lands have also been converted to residential, commercial, and industrial uses.

2.37 However, it seems that the development of affordable housing has not been given enough attention over the years. Housing requirements from 2005 to 2010, consisting of backlog and new households, reached about 500,000 units in Metro Manila and 461,400 units in Region III. Although Republic Act No. 7279 (known as the Balanced Housing Act) stipulates the requirement of 20% provision of socialized housing in subdivision development, developers have a choice of 20% of subdivision development area or outside of the same LGU, or 20% of development cost. Therefore, the Act is not able to promote the necessary socialized housing. There is also relocation site development by the government for project-impacted families and others. However, relocation sites are usually far from the main urban centers, lacking of required public infrastructures, lacking the accessibility to jobs, etc. Consequently, many relocated families go back to their original living places or other squatter areas in Metro Manila.

## **5) Transportation Development**

2.38 The transport infrastructure in Region III is composed of roads, airport and port while Metro Manila has roads, railways, inland waterways, airport and ports (see Figure 2.4.1). The main road network in the Study area includes the McArthur Highway and the North Luzon Expressway (NLEX) connecting Metro Manila, the Subic-Clark-Tarlac Expressway (SCTEX), Pampanga and Tarlac, the Tarlac-Pangasinan-La Union Expressway (TPLEX), and the Cagayan Valley Road in Region III, and 10 radial roads (R1 to R10) and six circumferential roads (C1 to C6) in Metro Manila. The main airports are Clark International Airport (CIA) located in Pampanga Province and Ninoy Aquino International Airport (NAIA) in Metro Manila. The major ports are the Subic Port in Zambales Province and the Port of Manila in the City of Manila. The railways of Metro Manila are PNR, LRT-1, LRT-2, and MRT-3.

2.39 Since the spatial development of the region is concentrated in Metro Manila in a monocentric way, connectivity with Metro Manila is one of the main concerns for Region III as well as the development of CIA as the gateway airport. NLEX functions as the north-south backbone in the region, connecting to Metro Manila. However, especially due to the traffic congestions at suburban areas and urban centers in Metro Manila, it takes a long time to travel from Region III to Metro Manila and vice-versa. For example, it takes more than 90 minutes of travel time from Malolos City, the capital of Bulacan, to the City of Manila.

2.40 Moreover, the lack of road network causes poor mobility at the local level. Road traffic concentrates on certain roads, generating traffic congestions in the city/municipal center. Due to the lack of all-weather roads, some roads are closed during floods.

2.41 Although Metro Manila has more transport infrastructure, its situation is much worse. Population and economic growth has led to growth in travel demand and car ownership. As a result, the traffic volume has almost reached the capacity of the current

road network and travel speed has declined significantly, particularly on major arterial roads such as EDSA. In spite of the decline in public transport use caused by rising car ownership, road-based public transport services are still dominant on roads. However, the average speed of these public transport modes is only 20 kph for all time periods, causing more congestion on roads. Moreover, with so many vehicles vying for limited road space, traffic accidents have become frequent occurrences. The impact of the current traffic congestion in Metro Manila cannot be neglected. It has been estimated that the economic cost of traffic congestion today is PHP2.4 billion/day and will reach PHP6 billion/day in a business-as-usual (BAU) scenario.<sup>2</sup>

2.42 The increase in traffic has also resulted in the worsening of air quality. Motor vehicles are the dominant source of air pollutants in the urban area. Emissions from mobile sources contribute significantly to total emissions of particulate matters (PM), volatile organic compounds (VOC), carbon monoxide (CO), and nitrogen oxides (NOx). The 2011 Environmental Management Bureau, Department of Environment and Natural Resources (EMB-DENR) data on monitored PM10 in nine stations around Metro Manila have exceeded standards (i.e., PM10 AQGV of 60 ug/NcM).



Source: Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas (Region III and Region IV-A).

**Figure 2.4.1 Transport Infrastructure Network in Metro Manila and Region III**

<sup>2</sup> Estimated in the “Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas (Region III and Region IV-A),” JICA, 2014.

## 2.5 Corridor Characteristics and Issues

2.43 The project corridor is composed of six cities/municipalities of Bulacan and three cities of Metro Manila. These are Malolos, Guiguinto, Balagtas, Bocaue, Marilao and Meycauayan in Bulacan, and Valenzuela, Caloocan and Manila in Metro Manila (see Figure 2.5.1). Along this corridor, about 4.6 million people reside in 360 sq.km of total area (see Table 2.5.1).

2.44 Malolos is the capital city of Bulacan and was declared as a Heritage Zone or Historic Center by the National Historical Commission of the Philippines (NHCP) in August 2001. Guiguinto is known as the garden heaven of Bulacan. The Garden City in Guiguinto is a main tourist attraction, with greeneries and colorful flowers. Balagtas is formerly known as Bigaa, and it was renamed in honor of the great Filipino poet, Francisco Balagtas. In 1946, the Historical Society of the Philippines placed a marker at the birthplace of Balagtas. Bocaue is one of the major urban centers in Bulacan, known as a fireworks capital of the Philippines due to its major industrial product. Marilao is a highly urbanized municipality and was listed as one of the world's 30 most polluted places in the developing world drawn up by a private New York-based institute. Meycauayan is the economic, industrial, commercial, financial and educational center of southern Bulacan. Meycauayan is also famous for its jewelry and leather industries, and has been the hub of jewelry production in the Philippines and in Asia.

2.45 Valenzuela is a major commercial and industrial center in the north of Metro Manila and was declared as one of the most business-friendly cities in the country in 2011. Caloocan is considered as an important gateway to North Luzon, and the Monumento CBD functions as the center of socio-economic activity for the CAMANAVA area. Manila is the capital of the Philippines and serves as a trade center because of the presence of international ports at Manila Bay. The city also hosts more than 40 universities and colleges.



Source: JICA Study Team.

Figure 2.5.1 Project Corridor

## 1) Spatial Structure

2.46 Manila is one of the core cities of Metro Manila, serving as a leading center of economy, industry, government, culture and various activities in the region beyond its administrative boundaries (see Figure 2.5.2). Manila is also connected to the world through the gateway ports along the Manila Bay. Valenzuela and Caloocan are the major urban cities in Metro Manila, providing the social and economic services not only for the northern Metro Manila but also for the south Bulacan Province. Malolos as a sub-regional center provides a wide range of services and facilities including employment opportunities, residence, education and health services, cultural activities, and administrative functions for Bulacan Province. Meycauayan is a major urban center and serves as the center of the government, economy and service of the city. The other four LGUs have less significance than the abovementioned LGUs along the project corridor.

2.47 Observing the current functions of LGUs along the corridor, it is obvious that their proximity to Metro Manila influences their level of development. Malolos has opportunities to be developed because the city has been assigned as the provincial capital. However, other LGUs, except Meycauayan, are still recognized as municipalities only and many remain as secondary urban centers.

## 2) Unbalanced Population Distribution

2.48 Since people are seeking better job opportunities, better social services and better living environment, it is common that they are drawn to the more developed cities. Manila had the highest population and population density in 2010 (1.7 million people with 408 persons/hectare), which was followed by Caloocan (1.5 million people with 281 persons/hectare) and Valenzuela (0.6 million people with 129 persons/hectare). While the population densities of LGUs in Metro Manila have already exceeded 100 persons/hectare, those in the Bulacan side are around 50 persons/hectare only.

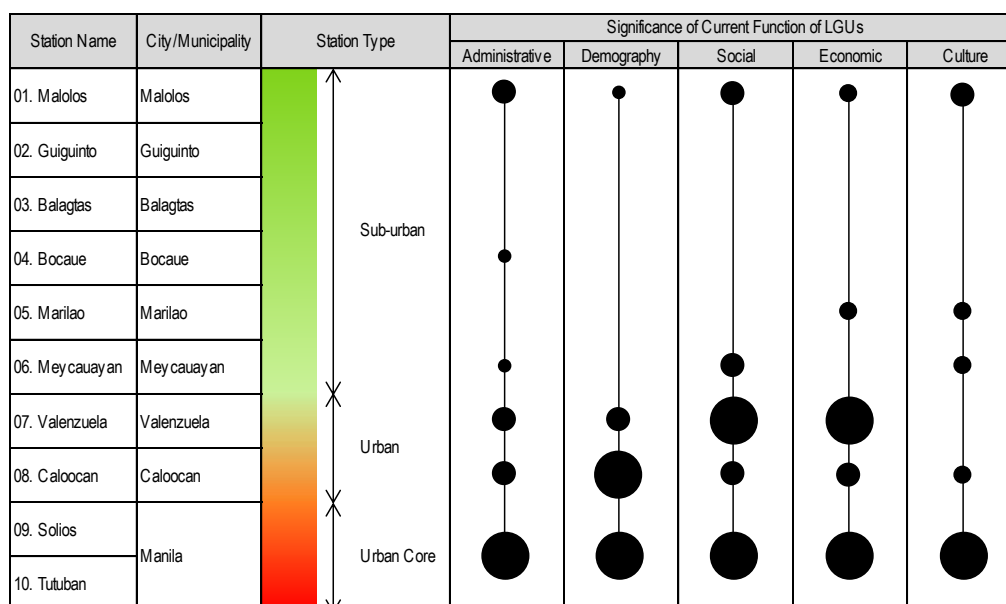
2.49 As the population densities of Meycauayan and Marilao are a bit higher than that of Malolos, Guiguinto, Balagtas and Bocaue, the spillover population from Metro Manila has increased the population in the adjacent LGUs. Marilao, in particular, has a very high population growth of 6.3% per year while that of Manila is less than 1.0% per year.

2.50 The population of overcrowded Manila continues to increase though at a decelerating rate. In order to decongest this area, it is essential to attract the people in Manila to other areas such as the cities and municipalities in Bulacan. Many people had moved to Manila to get jobs, so the provision of job opportunities in relocation sites is a critical issue.

**Table 2.5.1 Development Profile of LGUs along the Project Corridor**

Indicator			Malolos	Guiguinto	Balagtas	Bocaue	Marilao	Meycauayan	Valenzuela	Caloocan	Manila	
Area (sq.km)			67	28	29	32	34	32	45	53	40	
Spatial/ Administration	Urban Hierarchy		Sub-regional	2ndary Urban	2ndary Urban	Major Urban	2ndary Urban	Major Urban	Major Urban	Major Urban	Capital	
	Income Class		3rd City	1st Municipal	1st Municipal	1st Municipal	1st Municipal	3rd City	1st City	1st City	Special City	
Population	No. (000)		2000	175	68	57	87	101	163	485	1,178	1,581
			2010	235	91	65	106	186	199	575	1,489	1,652
	Density (persons/hectare)		2000	26.1	24.6	19.9	27.3	29.9	50.8	108.9	222.3	390.8
			2010	35	33	23	33	55	62	129	281.1	408.4
	AGR (% per year)		'00 - '10	2.97	2.97	1.40	2.03	6.27	2.02	1.71	2.37	0.44
Social Services	Health	No. of Hospitals	2010	12	4	4	4	2	8	11	15	31
		Malnutrition Rate (%)	2010	8	2	2	7	4	4	~ 4	2	n.a.
		Infant Mortality Rate (%)	2010	5	6	4	7	4	4	22 ('09)	17 ('09)	11 ('09)
Education	Tertiary School	2010	6	1	2	3	0	7	10	5	51	
Economy	Employment Share (%)	Primary	2007	2.9	2.4	3.0	1.7	0.9	0.1	0.2	0.2	0.06
		Secondary/Tertiary	2007	97.1	97.6	97.0	98.3	99.1	99.9	99.8	99.8	99.9
	No. of PEZA (under operation/being developed)		2013	0	0	0	0	1	1	0	1	3
	No. of Manufacturing		2010	143	78	79	29	267	293	709	n.a.	n.a.
	No. of Business/Commercial Establishments		2010	1,034	621	389	372	1,005	708	10,887	n.a.	2,474
Culture	No. of Declared Historical Sites and Structures		2011	4	0	0	0	0	0	0	1	23
	No. of Institutions/ Associations/ Organizations with Historical Markers		2011	0	0	0	0	0	0	0	0	84
	No. of Historical Sites and Structures with Historical Markers		2012	4	0	0	0	2	1	0	1	105

Source: NSO, Philippine Economic Zone Authority (PEZA), 2010 Socio-economic Profile (Province of Bulacan), Comprehensive Land Use Plans (CLUPs) of Valenzuela, Caloocan and Manila.



Source: JICA Study Team.

**Figure 2.5.2 Significance of Current Functions of LGUs**

### **3) Availability of Social Services**

2.51 In the past, the minimum basic needs were listed as food, shelter and clothing. However, considering the practical situation, the current minimum basic needs are not only food, shelter and clothing, but also sanitation, healthcare and education. In this context, social services, particularly healthcare and education, are considered as one of the development indicators.

2.52 In terms of facilities, both healthcare and education<sup>3</sup> services are concentrated in the LGUs in Metro Manila, which is followed by Malolos as a sub-regional center. Since Manila has been the center of education since the colonial period, there are several university clusters in the city such as University Belt in San Miguel District, Taft Avenue, etc. On the other hand, municipalities in Bulacan only have a few tertiary schools. The situation on healthcare services is similar to that of the education sector. The bigger cities have more healthcare facilities.

2.53 However, the health conditions of residents, especially children, are not always related to the availability of hospitals. The infant mortality rates of three cities in Metro Manila were much higher than those of other LGUs. The problem is not solely the presence of hospitals. There are hospitals, but many people may not have access to these hospitals due to poverty. Therefore, merely providing the facilities should not be the goal. It is necessary to improve accessibility to those services.

### **4) Concentration of Service-Oriented Economy in Metro Manila Only**

2.54 Data on GRDP at the LGU level are not available in the Philippines. Analyzing GRDP at the regional level, however, it can be said that the service-oriented economy developed in Metro Manila has been leading the economic development in the Philippines.

2.55 Along the project corridor, the employment shares of the primary sector in LGUs in and near Metro Manila are significantly lower than other LGUs. The main economic activities are farming, fishing and agro-industry in Malolos, Guiguinto, Balagtas and Bocaue, farming and manufacturing in Marilao and Meycauayan, manufacturing in Valenzuela, and services in Caloocan and Manila. The differences in the types and levels of these economic activities among LGUs have expanded the disparity of economic development along the corridor.

2.56 Many workers in the primary sector are generally part-time and seasonal workers, compared to workers in other sectors. The average total working time of workers in the primary sector does not reach 40 hours a week, and this increases the underemployment rate in the suburban and rural areas.

2.57 The business process outsourcing (BPO) industry is one of the main contributors in the services sector of Metro Manila. This kind of business can be established everywhere if the appropriate human resources are available. For example, places with colleges and vocational schools, like Malolos, have an opportunity to develop their services sector more.

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<sup>3</sup> Public elementary schools and high schools are allocated based on the size of administrative units. Therefore, only tertiary education is discussed in this section.

## **5) Environmental Degradation and Urbanization**

2.58 The project corridor is composed of areas with different urbanization levels, but the LGUs have been facing similar environmental problems such as degradation of air quality, increase in solid wastes, annual flood impacts, etc.

2.59 The environment of LGUs in Bulacan generally satisfies the environmental quality standards of the Philippines. However, rapid urbanization in recent years has aggravated environmental conditions, generating air pollution, water pollution and solid waste in residential, commercial and industrial areas. Urbanization is spread along the main roads, so an increase in traffic along those roads causes air pollution. Industrialization has increased the demands on groundwater resources. Unregulated extraction of groundwater has heavily strained groundwater resources. Weak solid waste management has caused solid waste dumping on waterways. The environmental situation of LGUs in Metro Manila is relatively worse since urbanization and motorization are more advanced.

2.60 Flooding is the common natural disaster along the project corridor, though the level of annual influence and its causes are varied. Almost all areas of LGUs in Bulacan are classified as having high or moderate susceptibility to flood since the areas are low lands and close to Manila Bay. The boundary between high and moderate susceptibility areas is around MacArthur Highway. The cities in Metro Manila are mainly classified as moderate susceptibility areas. Flooding is caused by siltation and encroachment of waterways, lack of drainage systems, dumping of solid wastes on waterways, illegal fishponds, reduction of open space, and informal settlements along waterways.

2.61 Floods obstruct traffic flow, which heavily affects economic activities, mobility and productivity. Heavy floods damage properties and take people's lives, too. Mitigating the flood risks and providing all weather transport system are among the urgent issues in the project corridor.

## **6) Accessibility to Metro Manila and Mobility in the Community**

2.62 As mentioned above, proximity to Metro Manila is one of the important factors for the socioeconomic development of the LGUs. Proximity not only means the physical distance but also the actual travel time to Metro Manila. Since only road-based transportation is available in the LGUs of Bulacan, travel time is affected by the level of traffic congestion. It takes about 80 minutes from Malolos to Manila without traffic. With heavy traffic, it takes 30–60 minutes only between Caloocan and Manila. That is how traffic congestion affects the travel time. However, the NLEX helps ease travel between Bulacan and the fringe areas of Metro Manila such as Balintawak in Quezon City. To shorten the travel time from Bulacan to Manila, it is expected to develop a railway line which is not affected by road traffic.

2.63 The main intra-LGU transport modes are tricycles and pedicabs in the LGUs of Bulacan, and jeepneys, tricycles and pedicabs in the LGUs of Metro Manila. Narrow and not well-planned road networks in the LGUs reduce local traffic circulation. Although traffic volume is not high, traffic congestion can be observed at intersections and some roads in Bulacan. Based on community size, there are many places where people can travel on foot. However, a poor pedestrian environment discourages people to walk. This situation increases the number of vehicle users, causing air pollution which worsens the pedestrian environment in a vicious circle.



## **7) Neglected Cultural Values**

2.64 Malolos, Marilao, Meycauayan, Caloocan and Manila have several historical sites and structures, but their historical or cultural values are disregarded in the development plan. Those sites can be not only tourist spots but also provide the uniqueness of communities and increase community development potentials. This uniqueness will attract people and investments, thereby contributing to community development.

2.65 While San Agustin Church in Manila is recognized as a World Heritage Site and is well-preserved, some of the historical sites in the LGUs, such as Bigaa Station in Balagtas, are not in good condition. Barasoain Church is one of the main tourist sites in Malolos, but there is no signage at the central terminal or along major roads that direct people to the site. These kinds of situations do not maximize the benefits from the historical and cultural values in the communities.

## 2.6 Expected Impact of NSCR on the Project Area

### 1) Summary of Development Issues

2.66 The development issues confronting the project area closely interrelated. It is expected that the area's socioeconomic conditions will further develop and it will continue to play a major role in sustaining the country's growth (see Table 2.6.1). However, without solving these development issues, socioeconomic development of the area would slow down. The main issues of the region are as follows:

- (a) **How to Mitigate Natural Disasters:** Although the region has geographical limitations, providing appropriate transport infrastructure and controlling land use in the flood prone areas can mitigate the impact of flooding. In addition, infrastructure and urban development planning should consider minimizing the risk of possible damages from future earthquakes.
- (b) **How to Decentralize the Functions of Metro Manila:** The centralized functions of Metro Manila have been increasing congestion in the area and straining social services and living conditions. Together with improving the connectivity to Metro Manila, those functions have to be decentralized to other urban centers in the region.
- (c) **How to Accommodate Informal Settlers:** It is obvious that Metro Manila cannot accommodate all informal settlers. One of the lessons learnt from previous relocation programs is to provide relocators access to jobs. New town development along the NSCR can satisfy this condition.
- (d) **How to Improve the Living Environment:** This can be addressed with the countermeasures against other issues.
- (e) **How to Improve Mobility, Accessibility and Safety:** Since there are several ongoing studies on railway projects in the region, implementing those projects can decongest road traffic and improve accessibility and mobility by public transport. Improvement of accessibility to the stations/stops, including pedestrian improvement, is also important to enhance the benefits of the projects.

**Table 2.6.1 SWOT Analysis of the Project Area as a Region**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Characterized by various natural environmental features such as valleys and seas</li> <li>• Functions as the economic center attracting more people and investment</li> <li>• Low poverty incidence</li> <li>• High share of tertiary sector in employment contributing to economic development of Metro Manila</li> <li>• Good natural environment in Region III contributing to maintaining natural resources and mitigating natural disasters</li> </ul>	<ul style="list-style-type: none"> <li>• Highly flood prone area due to flat and low terrain</li> <li>• High population density deteriorating the living environment</li> <li>• Large number of informal settlers, especially in hazard areas</li> <li>• Lack of affordable housing resulting in increase in informal settlers</li> <li>• Lack of job opportunities</li> <li>• Poor implementation of relocation programs by the government</li> <li>• Lack of transport infrastructures, lessening the opportunities for economic development</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Located in the Greater Capital Region which is expected to develop further opportunities for socio-economic development</li> <li>• Large area of alienable and disposable lands in Region III, which can be converted for urban development use</li> <li>• Approved transport infrastructure roadmap for the Greater Capital Region which integrates the transport development directions in relevant agencies</li> <li>• Several ongoing studies on railway development in the region</li> </ul>	<ul style="list-style-type: none"> <li>• Possibility of big earthquakes due to the presence of major fault lines</li> <li>• Increase in the number of informal settlers in urban centers, worsening urban environment (i.e., increase in squatters, crimes, etc.)</li> <li>• Poor control on private sector development which has resulted in increasing traffic congestions, shortage of affordable housing, etc.</li> </ul>

Source: JICA Study Team.

## 2) Expected Impact of the NSCR on the Project Area

2.67 The development of the NSCR will bring more than a new public transport system. The NSCR will be a new north-south backbone of Mega Manila, which can reorganize the spatial structure of the region. The areas along the NSCR can also benefit from new urban development opportunities. Better connectivity between Metro Manila and Bulacan may change the lifestyle of people in this region.

### (1) Reorganization of Spatial Structure

2.68 Strengthening the north-south backbone of Mega Manila by the NSCR will enhance the roles of LGUs along the NSCR corridor. The importance of urban centers in Bulacan, such as Malolos and Meycauayan, will increase, which can decongest the cities in Metro Manila. Malolos can be a more significant sub-regional center not only for Bulacan but also for Region III.

2.69 Integrating the suburban areas of Bulacan and the cities of Metro Manila can promote the socioeconomic development of both areas. Suburban areas will attract more people and investments while cities can reduce the economic losses by decongestion. New development opportunities will enhance the competitiveness of each LGU.

### (2) New Urban Development

2.70 It is expected that land uses along the NSCR and at stations will be reorganized for urban development. Considering the benefits of TOD, station areas will be developed as mixed-use compact urban space which is mainly used for commercial/business and residential purposes. This urban development can generate new job opportunities and better urban services.

2.71 The cities of Metro Manila have already been developed with high density. The development of the NSCR can be a trigger to revitalize those areas. It is inevitable to acquire a certain amount of land for railway and station development. Since the NSCR also requires land acquisition, it is a good opportunity to redevelop the station areas and adjacent areas.

2.72 There are many vacant lands along the NSCR corridor in the Bulacan areas. Those areas can be utilized for developing large-scale mixed use new towns. Integrating with NSCR will assure their accessibility to Metro Manila, so the new towns can also be considered as relocation sites for the spillover population in Metro Manila including squatters.

### (3) Better Transport Conditions

2.73 The travel time between Bulacan and Metro Manila will be significantly reduced. For instance, travel time between Malolos to Tutuban is expected to be reduced to less than half, from 80 minutes to 35 minutes (see Table 2.6.2). Faster travel time can encourage more people to commute from Malolos to Metro Manila and vice-versa.

2.74 The reliable schedule and comfortable ride of the NSCR can attract a significant number of people from road-based transport modes, including both the public transport and private car users. Thus, the reduction of traffic congestions in parallel roads is also expected. Decongestion on those roads can improve the air quality and contribute to mitigating climate change.

2.75 As an indirect impact of the NSCR, redevelopment/reorganization of station areas

and adjacent areas by TOD will improve the local traffic circulation, pedestrian environment, and inter-modal connectivity. Stations will become the new transport hub of each LGU, and the public transport system can be reorganized around the stations. The pedestrian environment, especially within 1-km from the station, will be improved with wide sidewalks with shades, pedestrian furniture, signage, etc.

**Table 2.6.2 Reduction of Travel Time by NSCR Development**

Station Name	Distance from Tutuban (km)	Travel Time from Tutuban (minutes)	
		Without NSCR <sup>1)</sup>	With NSCR
Malolos	36.7	82	36
Guiguinto	30.8	72	30
Balagtas	26.2	62	25
Bocaue	22.2	57	22
Marilao	16.8	48	17
Meycauayan	14.9	42	15
Valenzuela	11.3	40	12
Caloocan	5.6	25	6
Solis	2.0	10	2
Tutuban	-	-	-

Source: JICA Study Team, Study on Commuter Railway for Malolos-Tutuban Section in the Republic of the Philippines (NEDA Report).

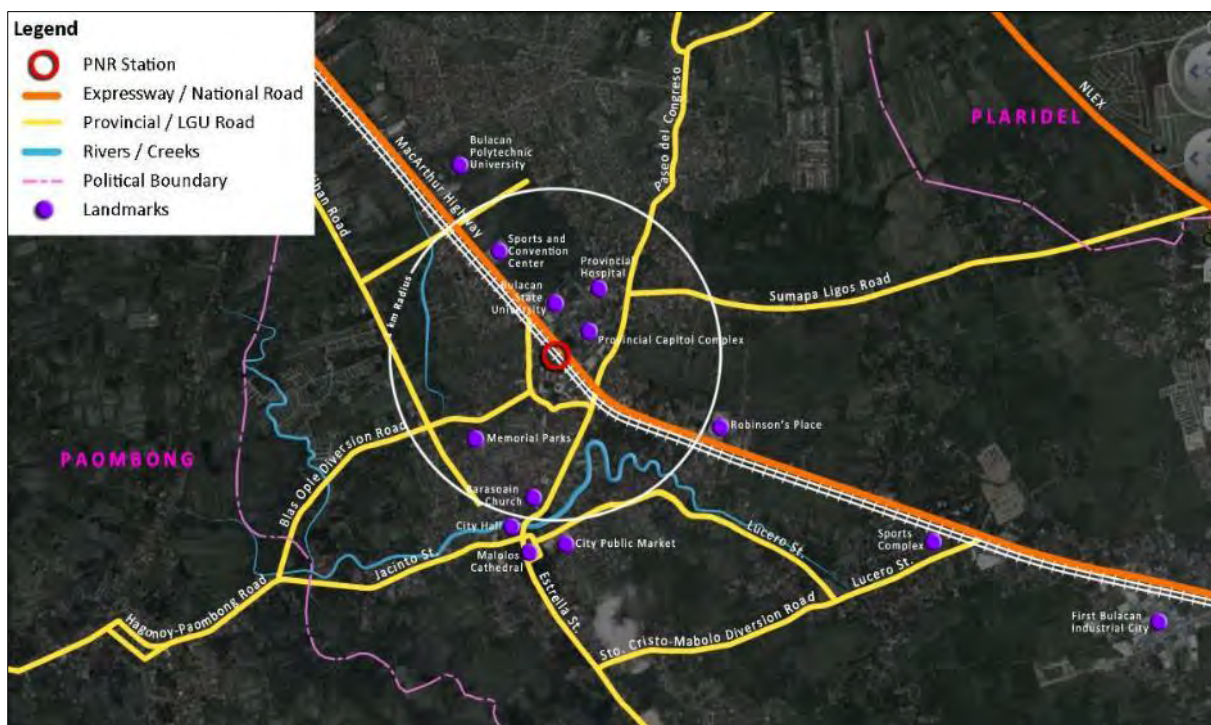
Note: <sup>1)</sup> Under ordinary traffic conditions.

### 3 CONCEPT PLAN

#### 3.1 Malolos Station

##### 1) Existing Situation

3.1 Malolos Station is located on the northwest section of Malolos City in Bulacan Province. The station will be the terminal station of the NSCR. The Malolos Station area plays a significant role as the provincial capital as well as a center of culture and education. The major facilities within a 1 km radius from the station (see Figure 3.1.1) are the Bulacan Provincial Capitol Complex and Bulacan State University which are about 250 m from the station, the Malolos City Hall on the southeast, and the Barasoain Church which is a famous tourist attraction in the province (see Figure 3.1.2). There are residential houses and mostly small-scale commercial stores around the area.



Source: JICA Study Team.

**Figure 3.1.1 Vicinity Map of Malolos Station Area**



**MacArthur Highway**



**Bulacan Capitol Park**



**Barasoain Church**

Source: JICA Study Team.

**Figure 3.1.2 Surrounding Environment of Malolos Station Area**

### **(1) Road Network**

3.2 Malolos Station, which is located 32.8 km from the intersection of EDSA and Samson Road/MacArthur Highway in Monumento, basically can be accessed from the National Highway, i.e., MacArthur Highway, as the station is adjacent to it. The existing PNR line runs parallel and close to MacArthur Highway.

3.3 The existing road network system surrounding the station was established based on the developments initiated by the different landowners and other developers and basically does not follow any road network plan. As such, the secondary roads are mixed up with the tertiary roads and the latter with the primary road, thus creating traffic flow conflicts along the major roads.

3.4 MacArthur Highway is the main artery of the road network in Malolos City and serves motorists and commuters coming from the south and those bound farther north either to Baguio or Ilocos Region. It also serves motorists and commuters within the city especially those residing near the highway through the subdivision and even barangay roads. Malolos Station can be accessed from the NLEX through the Pan Philippine Highway and Tabang Interchange, then MacArthur Highway northward.

3.5 The national highway accommodates all types of vehicles such as private cars, public transportation such as buses, jeepneys and even tricycles, and vans and trucks of various sizes transporting cargoes and goods.

3.6 The city roads such as Mabini St., Paseo del Congreso St., and Catmon Road/ Blas Ople Diversion Road serve motorists and commuters from adjacent barangays, which access interfaces with the said city roads. The roads are wider and basically longer and oftentimes stretch even to the farthest location of the city adjacent to the next municipality. Commuters using these roads are served by buses, jeepneys and tricycles.

3.7 Mabini St. runs from the intersection of MacArthur Highway towards the northeast to Pulilan, another municipality of Bulacan Province. It crosses over NLEX.

3.8 Numerous barangay and subdivision roads interface with the municipal roads and even with the national road, and serve motorists and commuters from the barangays and subdivision areas through tricycles and jeepneys.

### **(2) Existing/Ongoing Access Improvement Plan**

3.9 The existing roads in the Malolos Station area are well maintained, except for some barangay and subdivision roads, which show signs of wear and tear. The main national highway has a wide travel way while the expressways being operated by the private sector are in excellent condition. At the moment, except for minor patching and improvement of the pavement markings of the provincial and municipal roads, there are no proposals for other road improvement plans in the area.

### **(3) Current Land Use**

3.10 As the provincial capital, Malolos has many governmental facilities. Other major facilities are Bulacan State University and La Consolacion University Philippines (see Figure 3.1.3). Commercial facilities are located mainly along MacArthur Highway.



Source: JICA Study Team based on OpenStreetMap.

**Figure 3.1.3 Current Land Use of Malolos Station Area**

3.11 In order to identify opportunities for integrated development, a preliminary land availability survey was conducted. In this survey, an available vacant lot is defined as a large, contiguous vacant lot suitable for mixed-use subdivision or township development. As Figure 3.1.4 indicates, there are some available vacant lots in the area, ranging from about 2 hectare to 57 hectare. Their current land use is mostly agricultural (see Table 3.1.1).



Source: Land Use Survey by JICA Study Team.

**Figure 3.1.4 Available Vacant Lots of Malolos Station Area**

**Table 3.1.1 Ownership of Vacant Lots in Malolos Station Area**

Property No. 1)	Barangay	Lot Owner	Area (sq.m.)	Survey/Cadastral Lot No.	Actual Use
1	Mojon	Bautista, Enrique T. (Single)	22,996	Portion of L10-D, 10-FPSD 81	Agricultural
	Mojon	Bautista, Enrique T. (Single)	19,779	Portion of L10-D & 10-FPSD 5	Agricultural
	Mojon	Bautista, Enrique T. (Single)	11,373	Portion of L10-D, 10-FPSD 55	Agricultural
	Mojon	Buendia, Felicisima B. (Widow)	39,231	-	Agricultural
	Mojon	Reyes, Marita S. (Widow)	9,109	Portion of L99129912-A	Agricultural
	Mojon	Domingo, Alberto A. m/to Thelma G.	2,293	Portion of L99129912-B	Agricultural
	Mojon	Bautista, Enrique T. (Single)	82,812	-	Agricultural
	Mojon	AS Bautista and Sons	53,129	Portion of L10-D-10-FPSD-5	Agricultural
	Mojon	AS Bautista and Sons	105,702	2-B	-
	Mojon	Bautista, Antonio Jr. m/to Magdalena	109,005	1-A	-
	Mojon	Bautista, Antonio Jr. m/to Magdalena F	22,179	1-B	Agricultural
	Mojon	Enriquez, Ana, m/to Emilio Miranda	2,411	9909-A	-
	Mojon	Enriquez, Urbano	2,444	9909-B	-
	Mojon	Hernandez, Maria M.	2,444	9909-C	-
	Mojon	Enriquez, Atanacia m/to Esteban Carlos	2,445	9909-D	-
	Mojon	Enriquez, Aquilino m/to Cornelia	2,444	9909-E	-
	Mojon	Enriquez, Macaria m/ to Jacinto Tobias	2,444	9909-F	-
	Mojon	Dr. Luis Santos & Socorro Imperial, et.des.	76,838	Lot 36	-
Sub-Total			569,078		
2	Bulihan	Twin's Lending Investor Inc.	20,851	2747	Agricultural
3	Bulihan	Tan, Joseph C.	6,549	4993	Agricultural
	Bulihan	Tan, Joseph C.	43,451	42-C	Agricultural
Sub-Total			50,000		
4	Caniogan	Arce, Ernesto P. (Widower)	21,705	2150	Agricultural
5	Sumapang Matanda	(1) Maclang et al, Ramon O (2) Maclang, Marcelo O. (3) Maclang, Leilanie O. (4) Maclang, Marciano O. (5) Maclang, Arturo O.	23,177	2450-B	Agricultural
	Sumapang Matanda	Reyes, Carmelita & Antonieta	10,000	2450-B	Agricultural
	Sumapang Matanda	Martinez, Manuel (Single)	28,199	2453-A	Agricultural
Sub-Total			61,376		
6	Sumapang Matanda	C. Tiongson Realty & Development. Inc.	83,283	2477-E, Portion of Lot247-E PSD-4012	Residential, Agricultural
Total				806,293 (sq. m.)	

Source: Land Use Survey by JICA Study Team.

Note: 1) Property No. corresponds with the numbers in Figure 3.1.4.

## 2) Concept Plan

### (1) Issues

3.12 While there are many major facilities such as the Provincial Capitol Complex, historic heritage sites and universities within a 1 km distance to the Malolos Station, they are currently not well connected. Also, the community in the station area tends to be divided due to the limited number of pedestrian crossings along the arterial road (MacArthur Highway). Since the railway and the station are planned along MacArthur Highway, it is important to provide sufficient access to connect major facilities and the station including additional pedestrian crossings at the station. Such improvements on accessibility and mobility in the station area will promote ridership of the NSCR.

3.13 Since MacArthur Highway is a major arterial road and adjacent lands to the station



are already well developed, available lands for public transportation are limited.

3.14 While agricultural lands have been converted to residential areas in many places, these development projects have not been implemented according to a strategic master plan. This has resulted in inefficient land use which loses various economic opportunities as well as environmental integrity. The risk of flooding, in particular, has been increasing due to the expansion of residential areas without proper drainage facilities, greenery, etc.

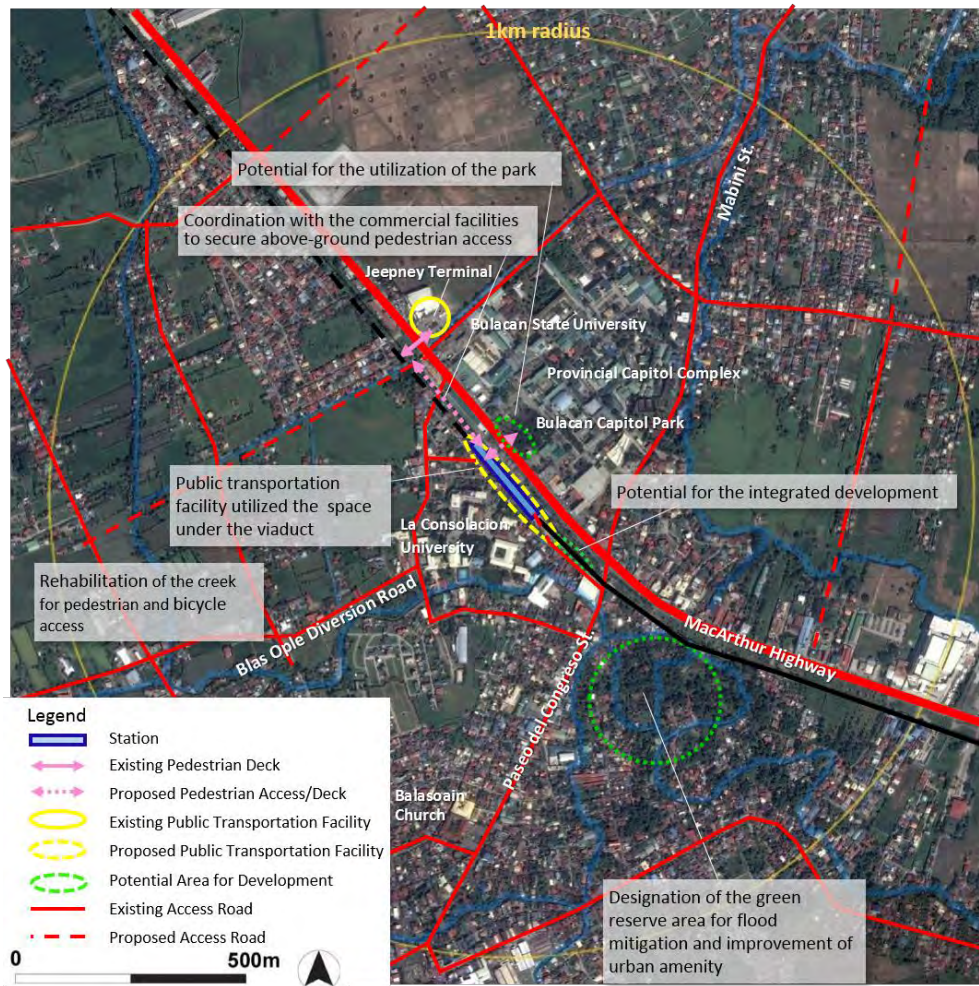
### **(2) Concept of TOD**

3.15 The concept of TOD is to “Leverage the NSCR and TOD to enhance the capital area as a competitive and cross-cultural urban core”. Since the Malolos Station area plays a significant role as the political, educational, cultural, and transportation hub, it can take advantage of TOD to make the area an attractive urban center.

### **(3) Concept Plan**

3.16 To overcome the abovementioned development issues, the following key interventions will be considered as major components of the concept plan shown in Figure 3.1.5:

- (i) Promote mid- to high-density mixed use through the reorganization of the spatial structure;
- (ii) Enhance the road network by connecting missing links to/from the station as well as to/from major facilities;
- (iii) Integrate the east and west urban areas through the proposed public transportation facilities and pedestrian deck over MacArthur Highway; and,
- (iv) Utilize available spaces to accommodate public transportation facilities (under the proposed viaduct, part of capitol park).



Source: JICA Study Team.

**Figure 3.1.5 Concept Plan of the Malolos Station Area**

### 3) Major Projects/Programs/Action Items

#### (1) List of Projects/Programs/Action Items and Roadmap

3.17 In order to clarify the concrete measure to implement TOD, major projects were identified as shown in Table 3.1.2. As indicated, projects relevant to the access improvement and public transportation facilities in station area within 200 m from the station need to be implemented by 2020, the start of NSCR operation.

**Table 3.1.2 Major Projects for Malolos Station**

	Project	Type	Term
1	Public transportation facility under the viaduct	Access Improvement	Short-term (by 2020)
2	Public transportation facility in Bulacan Capitol Park	Access Improvement	Short-term (by 2020)
3	Access roads / pedestrian deck to the station within 200m from the station	Access Improvement	Short-term (by 2020)
4	Access roads within 1 km radius from the station	Access Improvement	Mid-term (by 2020–2030)
5	Mixed-use facilities within 200 m from the station	Integrated Development	Mid-term (by 2020–2030)
6	Green reserve with retention facility	Mitigation of Flood Risk/ Improvement of Urban Environment	Mid- to Long-term (by 2030–2040)
7	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	Improvement of Access and Urban Environment	Mid- to Long-term (by 2030–2040)

Source: JICA Study Team.

## (2) Preliminary Cost Estimate for Access Improvement Projects

3.18 Among the major projects, preliminary cost was estimated for the access improvement projects (see Table 3.1.3 and **Appendix 5.2** in detail). Coordination with the relevant LGUs and local community will be required to prioritize the projects for implementation.

**Table 3.1.3 Estimated Costs of Preliminary Projects**

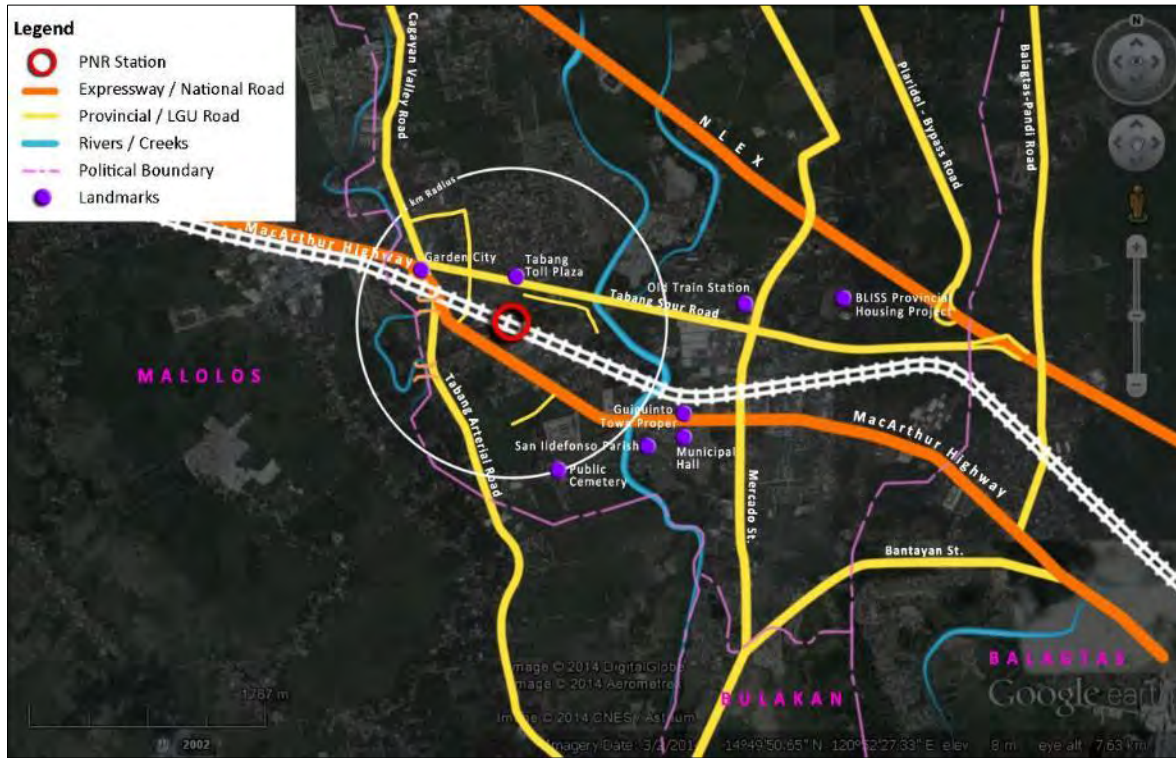
	Project	Area (sq. m.)	Cost (PHP 000)
1	Public transportation facility under the viaduct	4,000	7,020
2	Public transportation facility in Bulacan Capitol Park	4,610 (Half the area of the park)	15,627
3	Access roads/pedestrian deck to the station within 200m from the station)	Road: 8,000 (W=20 m, L=400 m) Pedestrian Deck: 900(W=3 m, L=300 m)	42,702
4	Access roads within 1 km from the station	26,000 (W=20 m, L=1,300 m)	138,782
5	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	23,950 (W=3 m x 2 sides, L=3993 m)	54,000

Source: JICA Study Team.

### 3.2 Guiguinto Station

#### 1) Existing Situation

3.19 The Guiguinto Station area is located on the southwestern part of the Municipality of Guiguinto and northwest of Guiguinto Municipal Hall which is 1.5 km from the station. The station is between NLEX Tabang Spur Road and MacArthur Highway (see Figure 3.2.1). The Tabang Toll Plaza is one of the major facilities at the station within a 1 km radius. Huge vacant lots surround the station (see Figure 3.2.2). There are several subdivisions along the south side of MacArthur Highway and the north side of Tabang Spur Road.



Source: JICA Study Team.

**Figure 3.2.1 Vicinity Map of Guiguinto Station Area**



**Station Location**



**Development at North Side of Highway**



**Informal Settlers within 1 km from Station**

Source: JICA Study Team.

**Figure 3.2.2 Surrounding Environment of Guiguinto Station Area**

## **(1) Road Network**

3.20 Guiguinto Station is 6.0 km south of Malolos Station and is about 26.8 km from Monumento. It is bounded on the north by Tabang Spur Road, a contiguous road serving entrance and exit ramps of NLEX through the Tabang Interchange, by MacArthur Highway on the south, a barangay road on the west, and a subdivision area on the east.

3.21 The area could be accessed from MacArthur Highway through St. Francis Road, a barangay road. While Tabang Spur Road is adjacent to Guiguinto Station, access is restricted by the spur road's boundary fence.

3.22 The existing road network system along the area is rather complicated, with a mixture of national road, provincial road and municipal road in one intersection, the Guiguinto Interchange.

3.23 In general, the station is surrounded by the following hierarchy of roads: MacArthur Highway is the main arterial road that connects Guiguinto Municipality with other areas in the south and the north and the primary road, which can provide direct access to Guiguinto Station. The national road accommodates public and private transportation bound for the north and the south. Public transportation consists of buses, jeepneys, taxis and even tricycles. Commercial vehicles are mainly pick-ups and vans while heavy loads are carried by trucks of varying sizes and classification. Being a national road traversing agricultural areas along the route, there are also slow moving vehicles called "kuligligs" (improvised rural vehicles consisting of two-wheeled trailers pulled by two-wheeled hand tractors powered by gas or diesel engines).

3.24 Access from NLEX is made through the Tabang Interchange and Spur Road (exit and entrance main ramp), Guiguinto Interchange, and then MacArthur Highway.

3.25 Tabang Municipal Road connects barangays along the route until it terminates and interfaces with MacArthur Highway near Guiguinto Interchange, the terminus of Tabang Spur Road. Rail users using the municipal road have to turn southeast along MacArthur Highway and then northeast along St. Francis Road to reach Guiguinto Station. The road is commonly used by private cars, public utility vehicles such as jeepneys and tricycles, varying sizes of cargo vehicles such as vans, pick-ups and trucks.

3.26 The only barangay road that serves Guiguinto Station is St. Francis Barangay Road, a short road connecting MacArthur Highway and interior roads along its route towards Tabang Spur Road. The road is being used by private vehicles owned by residents and tricycles for short trips to MacArthur Highway and other locations along Tabang Municipal Road.

## **(2) Existing/Ongoing Access Improvement Plan**

3.27 Similar to Malolos, the major roads within Guiguinto are well maintained and neither DPWH nor the Provincial Government of Bulacan has any major improvement project proposed at present for the roads in Guiguinto.

### (3) Current Land Use

3.28 The major land use in the vicinity of Guiguinto Station is residential and agricultural. As Figure 3.2.3 indicates, some industrial and commercial facilities are also located along MacArthur Highway.



Source: JICA Study Team based on OpenStreetMap.

**Figure 3.2.3 Current Land Use of Guiguinto Station Area**

3.29 Figure 3.2.4 shows that there are some available vacant lots in the area, ranging from about 4 hectare to 36 hectare (see also Table 3.2.1). Their current land use is mostly agricultural (irrigated rice land) and residential.



Source: Land Use Survey by JICA Study Team.

**Figure 3.2.4 Vacant Lots in Guiguinto Station Area**

**Table 3.2.1 Ownership of Vacant Lots in Guiguinto Station Area**

Property No. <sup>1)</sup>	Barangay	Lot Owner	Area (sq. m.)	Survey/ Cadastral Lot No.	Actual Use
1	Sta. Cruz	De Castro, Cresenciano & Monina Bengson (Sps.)	40,656	4	Orchard
2	Sta. Cruz	Bulaong, Timoteo m/to Policarpia Pagtalunan	31,199	97	Irrigated Riceland
	Sta. Cruz	Phil. Appliance Corp.	15,728	95-B-3	Commercial
	Sta. Cruz	Ang-Lazaro, Teresa (widow), et.al.	14,881	96-B	Irrigated Riceland
Sub Total			61,808		
3	Tabang	Bernardo, Cayetano (widower)	146,248	41	Irrigated Riceland, Residential
	Tabang	Bernardo, Cayetano (widower)	9,190	42	Irrigated Riceland
	Tabang	Caluag, Vicente	132,872	45	Irrigated Riceland, Residential
	Tabang	Bernardo, Brigida	23,477	27	Residential, Irrigated Riceland, Commercial
	Tabang	Cabrera, Herminia B. m/to Dionisio Cabrera	19,439	44	Irrigated Riceland, Residential
	Tabang	Planters Development Bank	16,388	93	Irrigated Riceland, Industrial
	Tabang	Guiguinto Agro Industrial Development Corporation	9,456	29	Irrigated Riceland
	Tabang	Santos, Rafael L. & Ester C. Santos (Sps.)	6,602	28	Irrigated Riceland
	Tabang	Mendoza, Carmelito m/to Corazon San Diego	1,966	46-A	Bacood, Residential
	Tabang	Mendoza, Ligaya	1,967	46-B	Bacood, Residential
	Tabang	Pagtalunan, Manuel & Felisa Capulong (Sps.)	1,121	47	Residential
	Sub-Total			368,726	
4	Ilang-Ilang	Caluag, Vicente	27,958	18	Irrigated Riceland, Residential, Industrial, Mangoland
	Ilang-Ilang	Alday, Alejandra	12,543	14	Residential, Industrial
Sub Total			40,501		
5	Tuktukan	Vergara, Juan R. & Valentina Gatdula (Sps.)	38,392	2	Irrigated Riceland
	Tuktukan	Almajose, Priscilla (single)	15,965	1324	Irrigated Riceland
Sub Total			54,357		
Total				566,048 (sq. m.)	

Source: Land Use Survey by JICA Study Team.

Note: 1) Property No. corresponds with the numbers in Figure 3.2.4.

## 2) Concept Plan

### (1) Issues

3.30 The 1 km radius area around the Guiguinto Station is occupied mainly by residential subdivisions and a few educational and industrial facilities. Although there are existing roads that traverse this area in the north-south and east-west directions, these are still considered insufficient. The current road transport link and pedestrian access from the areas north of NLEX Tabang Spur Road to the railway station south of NLEX Tabang Spur Road are still considered inadequate.

3.31 Another issue are the rivers and creeks at the west and east boundaries of the 1 km zone. The only roads traversing these waterways are the major highways of MacArthur and NLEX. These major roads are not designed to accommodate the short distance travel to the railway stations.

3.32 The 1 km radius area has approximately 25–30% vacant space that can be utilized for mixed-use type of developments. These vacant areas, once converted into traffic-generating establishments, will also require additional road access to the station.

3.33 Some areas in the immediate vicinity of the railway station are also being eyed as locations for local transportation intermodal facilities. With a relatively large vacant area within the 1 km radius of the station, these offer numerous development opportunities for the LGU. However, it is imperative that the land use plan and other development plans of the LGU should complement the establishment of the railway station and intermodal stations at this location. Otherwise, economic, social and environmental benefits from a transport-efficient system will not be fully realized.

### **(2) Concept of TOD**

3.34 The concept of TOD for the Guiguinto Station is to “facilitate the development of a new urban sub-center at the station area and encourage integration of land use.” The 1 km radius area has approximately 850,000 sq.m. of vacant spaces. The area north of NLEx is almost fully occupied by residential subdivisions. Future development plans have to be on the south of NLEx. The area has a promising horticulture industry. The developmental plans proposed for this area will be consistent with this existing industry. Significant portions of the vacant areas will be apportioned either for the horticulture industry or as green reserve areas for flood mitigation and urban amenities. The vacant areas in the immediate vicinity of the station are ideal for transport intermodal facilities. There is also ample space for the development of high-density mixed-use residential/commercial areas near the station.

### **(3) Concept Plan**

3.35 The development issues for the areas immediately surrounding the station and within a 1 km radius from the station will be addressed by a series of transport infrastructure measures (see Figure 3.2.5) that will enhance access to the railway station, as follows:

- (i) Promote development plans consistent with the more extensive horticulture industry;
- (ii) Retain green spaces for flood mitigation and urban amenities;
- (iii) Improve pedestrian access from subdivisions located north of NLEx Tabang Spur Road to Guiguinto Station;
- (iv) Develop a secondary road network by providing additional north-south road transport linkages from NLEx Tabang Spur Road and Violeta St. Complete this transport network by providing an access road parallel to the rail alignment from Krus St. to MacArthur Highway;
- (v) Utilize the vacant areas within the vicinity of the station for local transport intermodal facilities; and,
- (vi) Coordinate with TESDA for land acquisition. Generate more traffic to the transit line by developing these areas surrounding the stations to high-density mixed-use residential and commercial buildings.





Source: JICA Study Team.

**Figure 3.2.5 Concept Plan of Guiguinto Station Area**

### 3) Major Projects/Programs/Action Items

#### (1) List of Projects/Programs/Action Items and Roadmap

3.36 As indicated, projects relevant to the access improvement and public transportation facilities in station area within 200 m from the station need to be implemented by 2020, the start of NSCR operation (see Table 3.2.2).

**Table 3.2.2 Major Projects in Guiguinto Station Area**

	Project	Type	Term
1	Public transportation facilities	Access Improvement	Short-term (by 2020)
2	Access roads to the station (direct access)	Access Improvement	Short-term (by 2020)
3	Access roads within 1 km from the station	Access Improvement	Mid-term (by 2020–2030)
4	Mixed-use facilities within 200 m from the station	Integrated Development	Mid-term (by 2020–2030)
5	Mixed-use facilities within 1 km from the station	Integrated Development	Mid- to Long-term (by 2030–2040)
6	Green reserve with retention facility	Mitigation of Flood Risk/ Improvement of Urban Environment	Mid- to Long-term (by 2030–2040)
7	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	Improvement of Access and Urban Environment	Mid- to Long-term (by 2030–2040)

Source: JICA Study Team.

## (2) Preliminary Cost Estimate for Access Improvement Projects

3.37 Among the major projects, preliminary cost was estimated for the access improvement projects (see Table 3.2.3 and **Appendix 5.2** in detail). Coordination with the relevant LGUs and local community will be required to prioritize the projects for implementation.

**Table 3.2.3 Estimated Costs of Preliminary Projects**

	Project	Area (sq. m.)	Cost (PHP 000)
1	Public transportation facilities	5,000	16,935
2	Access roads to the station (direct access)	8,000 (W=20 m, L=400 m)	42,702
3	Access roads within 1 km from the station	100,200 (W=20 m, L=5,010 m)	534,847
4	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	25,560 (W=3 m x 2 sides, L=4,260 m)	60,500

Source: JICA Study Team.

### 3.3 Balagtas Station

#### 1) Existing Situation

3.38 Balagtas Station is located almost at the center of the Municipality of Balagtas and on the northwest of Balagtas Municipal Hall, which is 900 m from the station. Remarkably, the station is located right between NLEX and MacArthur Highway (see Figure 3.3.1). The major facility within a 1 km radius from the station is the Balagtas Town Proper (see Figure 3.3.2).



Source: JICA Study Team.

**Figure 3.3.1 Vicinity Map of Balagtas Station Area**



**Station Location**



**MacArthur Highway**



**Residential Area along Balagtas Pandi Rd.**

Source: JICA Study Team.

**Figure 3.3.2 Surrounding Environment of Balagtas Station Area**

#### (1) Road Network

3.39 Balagtas Station is bounded by NLEX on the north, Balagtas–Pandi Road on the west, MacArthur Highway on the south, and a barangay road on the east.

3.40 Direct access to the rail station is made through the Balagtas–Pandi Road for passengers coming from the north and from the south through the MacArthur Highway.

3.41 Access from NLEX is provided by the Balagtas Interchange from the north and

through the same Balagtas–Pandi Road, while access from the south is made through the Bocaue Interchange then Taal Bocaue Municipal Road, MacArthur Highway, and Balagtas–Pandi Road.

### (2) Existing/Ongoing Access Improvement Plan

3.42 In the Balagtas Station area, there is an ongoing new road construction project under the DPWH, namely: Arterial Road Bypass Project Phase I (Plaridel Bypass and Cabanatuan Bypass), which involves the construction of a 6.6 km bypass road, one interchange, one bridge and two access roads in the areas of Plaridel, Bulacan and Cabanatuan City. The road project is being funded by JICA.

### (3) Current Land Use

3.43 The major land use in the vicinity of Balagtas Station is residential and agricultural. The area also has several commercial and educational facilities. As Figure 3.3.3 indicates, most of the commercial and educational facilities are located along MacArthur Highway.



Source: JICA Study Team based on OpenStreetMap.

**Figure 3.3.3 Current Land Use of Balagtas Station Area**

3.44 There are vacant lots on the east and northeast from the Balagtas Station. Their areas are 8 hectare to 12 hectare, all of which are used for agriculture (see Figure 3.3.4 and Table 3.3.1).



Source: Land Use Survey by JICA Study Team.

**Figure 3.3.4 Available Vacant Lots in Balagtas Station Area**

**Table 3.3.1 Ownership of Vacant Lots in Balagtas Station Area**

Property No. 1)	Barangay	Lot Owner	Area (sq.m.)	Survey/Cadastral Lot No.	Actual Use
1	Longos	Sanchez, Conrado L. m/to Erlinda Sarmiento	15,926	532	Irrigated Riceland
	Longos	Gonzales, Jorge m/to Lucita Deloso	20,000	30-B-2	Irrigated Riceland
	Longos	Galves, Sotero & Flordeliza Galvez (Sps.)	10,115	30-B-3-C	Irrigated Riceland
	Longos	Lorenzo, Asuncio, Rep. of the Phils. Claimed by:	15,229	539	Irrigated Riceland
	Longos	Peralta, Renato m/to Lucila Ramos	6,884	558	Irrigated Riceland
	Longos	Sanchez, Feliciano T.	13,811	562, Cad.333	Irrigated Riceland
Sub-Total			81,965		
2	Longos	Alejandrino, Pio & Mercedes Javier Alejandrino (Sps.)	16,328	69 Plan	Irrigated Riceland
	Longos	Reyes, Leonora m/to Sotero Pabaya; Julia Reyes m/to Ernesto Trivino; Edilberta Reyes m/to Bonifacio Nina; Bienvenido Reyes m/to Maria Liwanag; Maxima Reyes m/to Ruben Enriquez; & Maura Reyes m/to Narciso De Leon (all 1/6 share each)	16,413	1	Irrigated Riceland
	Longos	Caeg, Pedro R. & Gloria E. Caeg	17,011	441	Irrigated Riceland
	Longos	Santos, Igmidio m/to Teresita Santos; Rufino Santos m/to Angela Santos; Jacinto Santos m/to Zenaida Santos; Graciano Santos, Leonora Santos & Juanita Santos (all single), et. al.	28,070	3	Irrigated Riceland
	Longos	Villar, Manuel M. m/to Corita Bamboa	10,670	425	Irrigated Riceland
	Longos	Villarica, Angel m/to Nieves Palma, et. al.	5,879	397	Irrigated Riceland
	Longos	Pacheco, Eduardo m/to Gregoria Barcelon	9,282	400	Irrigated Riceland
	Longos	Galvez, Pia S. (single)	10,466	399	Irrigated Riceland
	Longos	Bauza, Amalia F., single	7,409	392	Irrigated Riceland
	Sub-Total			121,528	
Total				203,493 (sq. m.)	

Source: Land Use Survey by JICA Study Team.

Note: 1) Property No. corresponds with the numbers in Figure 3.3.4.

## 2) Concept Plan

### (1) Issues

3.45 The rail alignment bisects Balagtas Municipality at an equidistant location from NLEX and MacArthur Highway. Road transport linkages to these major highways are far from ideal, especially from NLEX. Access to the existing low- to medium-density residential areas at the immediate vicinity of the station will require improvement, especially if

development plans will convert these to high-density enclaves. The 1 km radius area also has a significant portion of unoccupied land. Once these areas are proposed for high-density development, road access to the station will have to be improved as well.

3.46 The Comprehensive Land Use Plan (CLUP) that is not strictly implemented may result to inefficient land use, which then translates to socioeconomic loss and environmental degradation. The CLUP of Balagtas identified areas of this generally flat and low-lying municipality that are flood-prone. Rapid urban development has increased the volume of additional solid waste settlement at the bottom of the waterways. This has further decreased the carrying capacities of rivers and streams, thus increasing the incidence of floods.

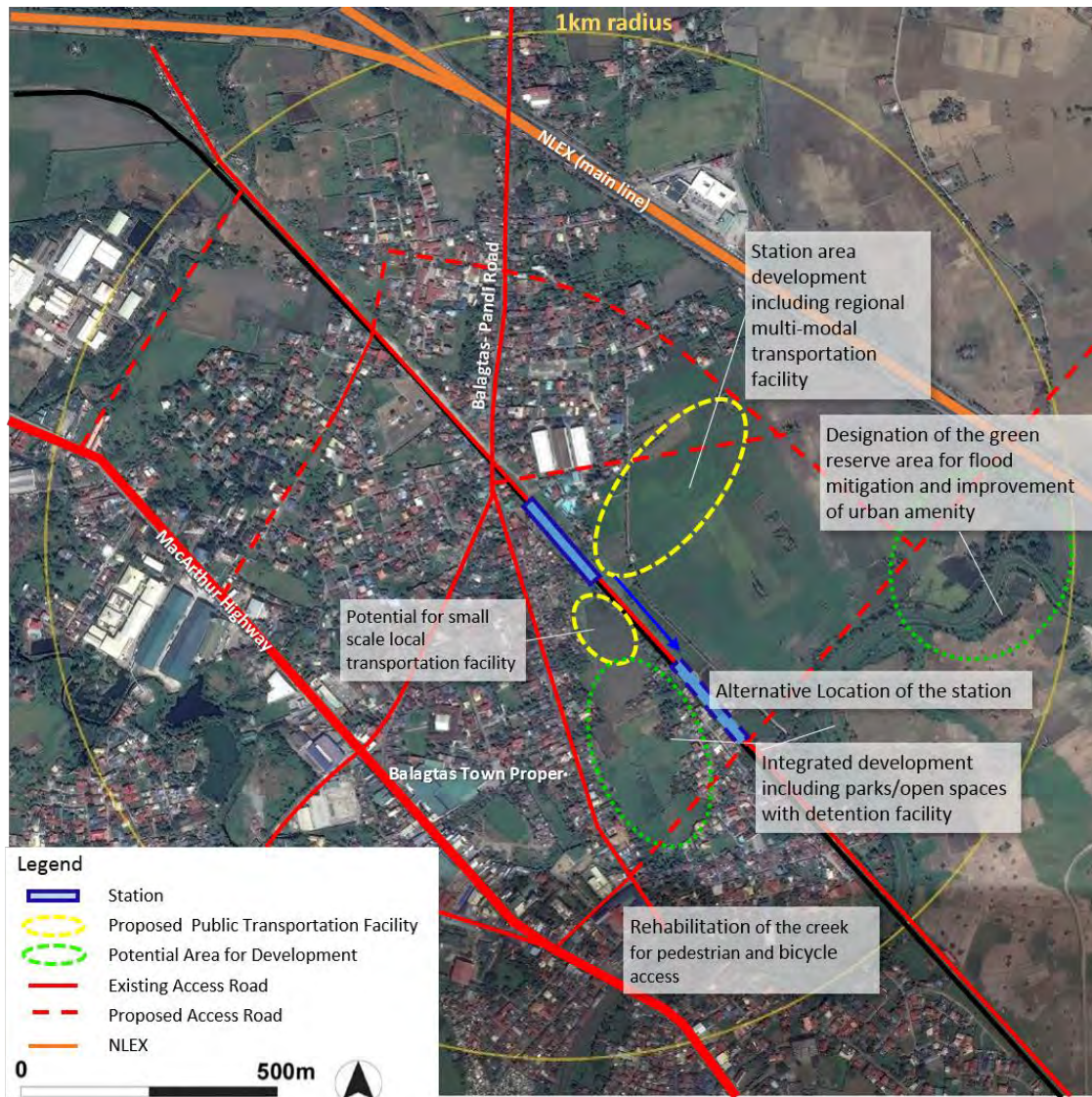
## **(2) Concept of TOD**

3.47 The concept of TOD for the Balagtas Station area is the “Redistribution of development to unoccupied spaces and establishment of an inter-city/regional multimodal facility”. The potential to redistribute development to the unoccupied areas near Balagtas Station is quite high, with almost 40% of the 1 km radius area currently vacant. Located east of the station is a huge unoccupied area that has the potential to be developed as medium- to high-density mixed-use areas. Aside from this development, the area adjacent to the proposed station can be developed as a regional multimodal transport facility.

## **(3) Concept Plan**

3.48 The key interventions required to enhance the area’s viability as a TOD area that can potentially feed traffic to the rail system are the following (see Figure 3.3.5):

- (i) Establish a regional multi-modal transport facility near the station;
- (ii) Improve the road network by developing secondary roads that will link existing major roads and provide additional access to the railway station. Roads linking MacArthur Highway, NLEX and the railway line are proposed as transport network strengthening measures. The proposed secondary roads include links to the proposed mixed-use development located east of the station;
- (iii) An alternative location of the station can be developed more freely as compared to the original location as the alternative area has relatively more unoccupied areas within its vicinity; and,
- (iv) Some areas will be kept unoccupied or converted to parks or green reserve areas. These green spaces will function as flood mitigators or water retention facilities.



Source: JICA Study Team.

**Figure 3.3.5 Concept Plan of Balagtas Station Area**

### 3) Major Projects/Programs/Action Items

#### (1) List of Projects/Programs/Action Items and Roadmap

3.49 As indicated, projects relevant to the access improvement and public transportation facilities in station area within 200 m from the station need to be implemented by 2020, the start of NSCR operation (see Table 3.3.2).

**Table 3.3.2 Major Projects in Balagtas Station Area**

	Project	Type	Term
1	Public transportation facilities	Access Improvement	Short-term (by 2020)
2	Access roads to the station (direct access)	Access Improvement	Short-term (by 2020)
3	Access roads within 1 km from the station	Access Improvement	Mid-term (by 2020–2030)
4	Mixed-use facilities within 200 m from the station	Integrated Development	Mid-term (by 2020–2030)
5	Mixed-use facilities within 1 km from the station	Integrated Development	Mid- to Long-term (by 2030–2040)
6	Green reserve with retention facility	Mitigation of Flood Risk/Improvement of Urban Environment	Mid- to Long-term (by 2030–2040)

Source: JICA Study Team.

## (2) Preliminary Cost Estimate for Access Improvement Projects

3.50 Among the major projects, preliminary cost was estimated for the access improvement projects (see Table 3.3.3 and **Appendix 5.2** in detail). Coordination with the relevant LGUs and local community will be required to prioritize the projects for implementation.

**Table 3.3.3 Estimated Costs of Preliminary Projects**

	Project	Area (sq. m.)	Cost (PHP 000)
1	Public transportation facilities	10,000	33,870
2	Access roads to the station (direct access)	10,000 (W=20 m, L=500 m)	53,378
3	Access roads within 1 km from the station	72,600 (W=20 m, L=3,630 m)	387,524

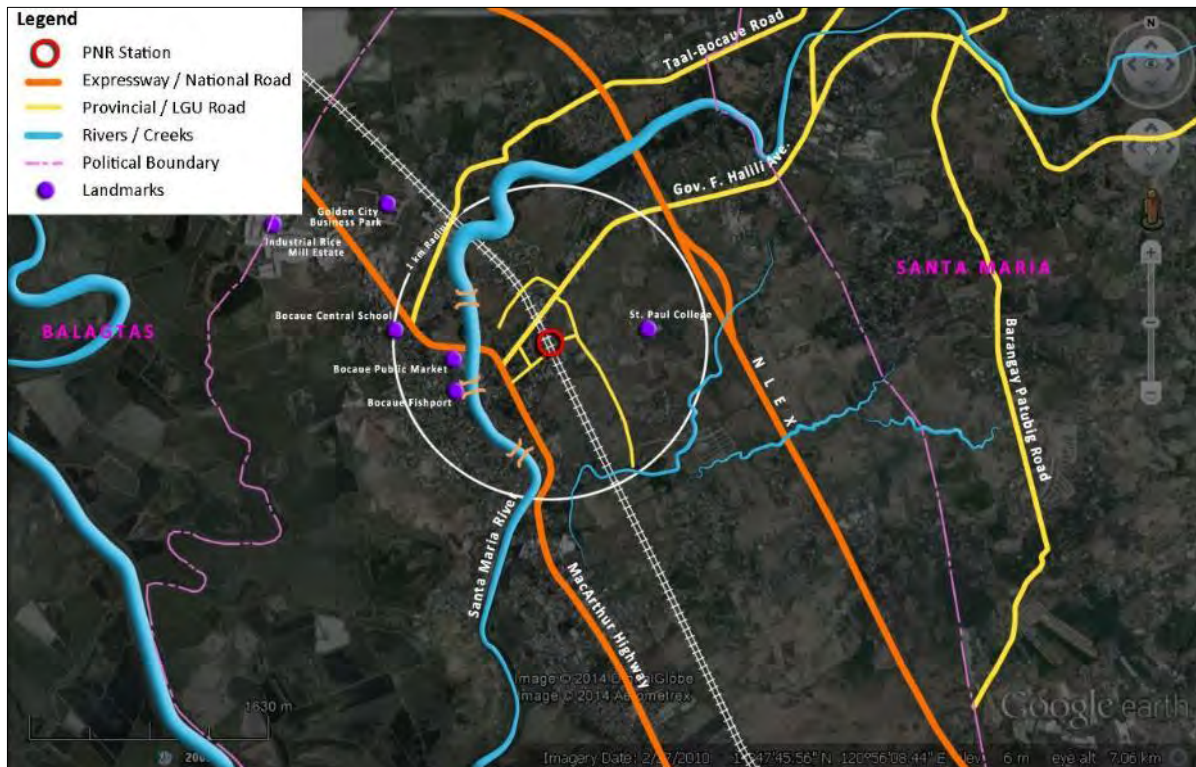
Source: JICA Study Team.



### 3.4 Bocaue Station

#### 1) Existing Situation

3.51 Bocaue Station is located almost at the center of the Municipality of Bocaue and northeast of Bocaue Municipal Hall. Santa Maria River runs from north to south within 1 km from the station. The major facilities within 1 km radius from the station are St. Paul Hospital, St. Paul College, and Bocaue Public Market (see Figure 3.4.1). Although the distance is about 2.5 km, there is also the Philippine Arena, which is the biggest arena in the world. There are informal settlements near the station (see Figure 3.4.2).



Source: JICA Study Team.

**Figure 3.4.1 Vicinity Map of Bocaue Station Area**



Access Road to the Station

Informal Settlement along Lumlot Rd.

Bocaue City Hall

Source: JICA Study Team.

**Figure 3.4.2 Surrounding Environment of Bocaue Station Area**

#### (1) Road Network

3.52 Bocaue Station is located at the southeast of the intersection of Gov. Halili Ave. and the PNR line, which also serves as access to the station. Gov. F. Halili Ave. intersects MacArthur Highway at the southwest of the station. Surrounding the station are narrow

barangay and subdivision roads but these are connected to Gov. F. Halili Ave. as well.

3.53 Farther southeast, the station can be accessed through the Marilao Service Road, which has its terminus connected at the Marilao Interchange of NLEX. The terminus of Marilao Service Road at the northern side connects with a barangay road in Barangay Bundukan, the latter traversing southwest and connecting with MacArthur Highway at the former's terminal.

3.54 Gov. F. Halili Ave., being a municipal road and similar to other municipal roads in the province, is served by public vehicles consisting of jeepneys and by tricycles for short trips along the road. Private vehicles normally use the municipal road coming from MacArthur Highway to destinations northeast. Commercial vehicles likewise pass along the municipal road. Barangay roads are served by private vehicles and small-scale transport such as tricycles.

### (2) Existing/Ongoing Access Improvement Plan

3.55 The nearest proposed project within the Bocaue Station area is that located in Calumpit, which involves the construction of a bridge along Manila North Road.

### (3) Current Land Use

3.56 The major land use in the vicinity of Bocaue Station is residential on the west, and agricultural on the east. Many educational facilities are found within and around 1 km from the station (see Figure 3.4.3).



Source: JICA Study Team based on OpenStreetMap.

**Figure 3.4.3 Current Land Use of Bocaue Station Area**

3.57 There are many vacant lots on the east and south of Bocaue Station. With areas ranging from 8 hectare to 12 hectare, these are comparatively smaller than those in the other stations. All these vacant lots are used for agriculture (see Figure 3.4.4 and Table 3.4.1)



Source: Land Use Survey by JICA Study Team.

**Figure 3.4.4 Available Vacant Lots in Bocaue Station Area**

**Table 3.4.1 Ownership of Vacant Lots in Bocaue Station Area**

Property No. <sup>1)</sup>	Barangay	Lot Owner	Area (sq. m.)	Survey/Cadastral Lot No.	Actual Use
1	Turo	De Guzman, Maxima, et.al.	18,551	2455, Cad 332	Irrigated Riceland
	Turo	Reyes, Maria Josefina M. m/to RomanFelipe S. Reyes	19,208	14-B	Irrigated Riceland
	Turo	Del Rosario, Pacencia G.(widow); Teresita G. Del Rosario (single); Corazon G. Del Rosario (single); Rogelio G. Del Rosario (single); and Carina G. Del Rosario (single) (all equal shares)	12,032	19-B Subd. Plan	Irrigated Riceland
	Turo	Reyes, Adelina m/to Mariano Reyes	14,382	3113	Irrigated Riceland
Sub-Total			64,173		
2	Turo	Villanueva, Eduardo C. Rev. m/to Adoracion J. Villanueva	19,474	12-B-2-B	Irrigated Riceland
3	Biñang II	San Pedro, Ceferino (widower)	15,024	A	
	Biñang II	San Pedro, Renato m/to Estela Adajar	17,947	B	Irrigated Riceland
Sub-Total			32,971		
4	Biñang I	Benedicto, Jose	14,000	-	Irrigated Riceland
	Biñang I	Benedicto, Bienvenido	15,984	1470	Irrigated Riceland
Sub-Total			29,984		
Total				146,602 (sq. m.)	

Source: Land Use Survey by JICA Study Team.

Note: 1) Property No. corresponds with the numbers in Figure 3.4.4.

## 2) Concept Plan

### (1) Issues

3.58 The Bocaue Station is where the largest proportion of unoccupied land is located along the NSCR route. It is, therefore, expected that the road network at this site is relatively undeveloped. The developed areas are concentrated west of the station and along MacArthur Highway. However, new developments are rapidly sprouting on the east side of the rail alignment. These developments have been initiated by locators such as the Philippine Sports Arena and St. Paul College, among others.

3.59 The Bocaue Town Proper is located west of Sta. Maria River. There are only two bridges that traverse this river and provide connection to the railway station located east of Sta. Maria River. These linkages connecting the town proper to the east side will be insufficient once the railway system becomes operational. The rail station is expected to attract more traffic from the town proper.

3.60 Another issue that must be addressed is the high incidence of flooding. The town is a low-lying flat area that has historically experienced frequent flooding.

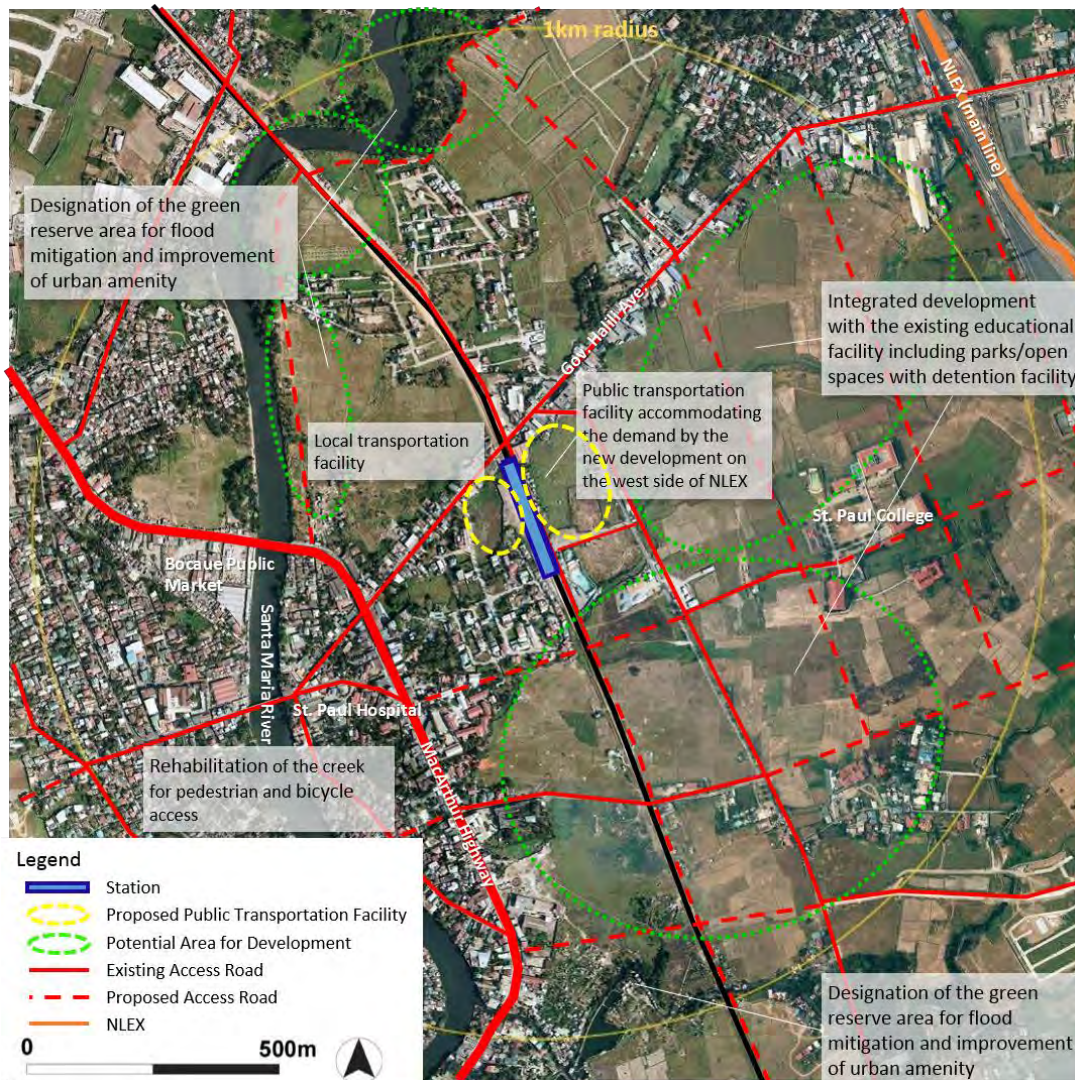
### **(2) Concept of TOD**

3.61 The concept of TOD for the Bocaue Station area is the "Development of unoccupied lands and expansion of the road network on Bocaue East". There are vast, unoccupied lands east of Sta. Maria River that are ripe for development. Several sports and educational facilities have already initiated the development process in this area. The operation of a reliable mass transit line along this route will promote the area as a viable location for developers. With an area relatively free of structures, this will provide the LGU and developers various options in road infrastructure and real estate development. These development initiatives, however, should be consistent with the objectives of TOD, and that is to promote use of transit to improve rail ridership and fare box revenues.

### **(3) Concept Plan**

3.62 The road infrastructure network east of the station is relatively undeveloped. At this location are huge tracts of land that are still vacant. Development of the road network will be easier as there are numerous possible route options that are free of structural obstructions. The CLUP of the municipality, however, may need to be revised to accommodate conversion of certain areas used for food production to a mixed-use residential-commercial area. The key intervention measures that are essential in the successful application of TOD concepts to the area are as follows (see Figure 3.4.5):

- (i) Formulate and implement a strategic plan that is consistent with the CLUP of the municipality;
- (ii) Improve connectivity to the town proper by constructing an additional bridge;
- (iii) Extension of the road network east of the station to accommodate future development plans of mixed-use residential/commercial/educational establishments; and,
- (iv) Designation of green reserve areas for flood mitigation and improvement of urban amenities.



Source: JICA Study Team.

**Figure 3.4.5 Concept Plan of Bocaue Station Area**

### 3) Major Projects/Programs/Action Items

#### (1) List of Projects/Programs/Action Items and Roadmap

3.63 As indicated, projects relevant to the access improvement and public transportation facilities in station area within 200 m from the station need to be implemented by 2020, the start of NSCR operation (see Table 3.4.2).

**Table 3.4.2 Major Projects in Bocaue Station Area**

	Project	Type	Term
1	Public transportation facilities	Access Improvement	Short-term (by 2020)
2	Access roads to the station (direct access)	Access Improvement	Short-term (by 2020)
3	Access roads within 1 km from the station	Access Improvement	Mid-term (by 2020–2030)
4	Mixed-use facilities within 200m from the station	Integrated Development	Mid-term (by 2020–2030)
5	Mixed-use facilities within 1 km	Integrated Development	Mid- to Long-term (by 2030–2040)
6	Green reserve with retention facility	Mitigation of Flood Risk/Improvement of Urban Environment	Mid- to Long-term (by 2030–2040)

Source: JICA Study Team.

## (2) Preliminary Cost Estimate for Access Improvement Projects

3.64 Among the major projects, preliminary cost was estimated for the access improvement projects (see Table 3.4.3 and **Appendix 5.2** in detail). Coordination with the relevant LGUs and local community will be required to prioritize the projects for implementation.

**Table 3.4.3 Estimated Costs of Preliminary Projects**

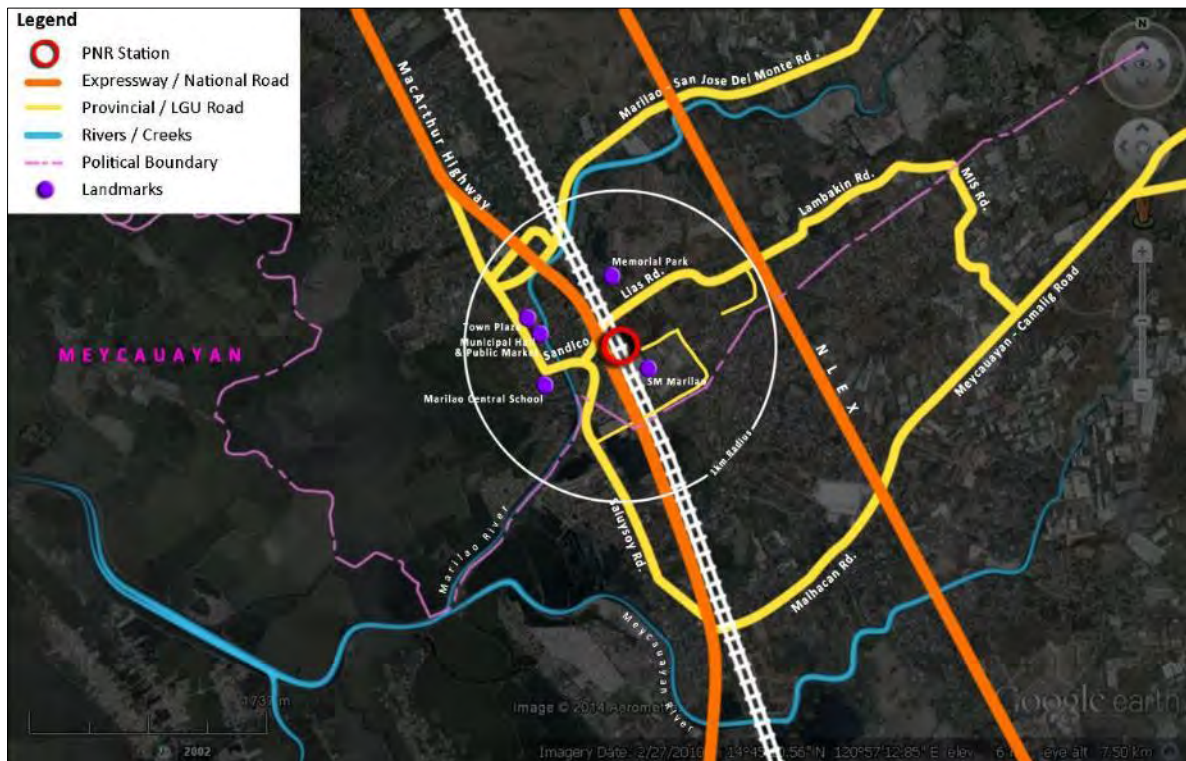
	Project	Area (sq.m.)	Cost (PHP 000)
1	Public transportation facilities	5,000	16,935
2	Access roads to the station (direct access)	12,000 (W=20 m, L=600 m)	64,053
3	Access roads within 1 km from the station	126,000 (W=20 m, L=6,300 m)	672,562

Source: JICA Study Team.

### 3.5 Marilao Station

#### 1) Existing Situation

3.65 Marilao Station is located on the southwest of Municipality of Marilao and northwest of the Marilao Municipal Hall. The station is along the McArthur Highway and close to SM Marilao Mall. Public transport facilities such as a jeepney terminal is located at the SM Marilao property. The distance between the station and SM Marilao is just about 100 m (see Figure 3.5.1). Both the municipal hall and the public market are located about 650 m west from the station. Since the area is a flood-prone area, water level reaches more than 1.5 m during floods (see Figure 3.5.2).



Source: JICA Study Team.

**Figure 3.5.1 Vicinity Map of Marilao Station Area**



**SM Marilao Mall**



**Road Flooding at West Side of Highway**



**Marilao River**

Source: JICA Study Team.

**Figure 3.5.2 Surrounding Environment of Marilao Station Area**

### **(1) Road Network**

3.66 The Marilao Station site sits near SM Marilao since the PNR line runs alongside MacArthur Highway. Since the PNR property is fenced throughout except at road crossings, access is made at the nearest road crossing, which in this site is through Lias Road, a municipal road traversing the northeast even after it crosses NLEx. The road then changes direction southeast to connect with Meycauayan Camalig Municipal Road.

3.67 Marilao Station is surrounded by major roads such as MacArthur Highway, a national road, and Saluysoy Road, Lias Road and Malhacan Road, which are municipal roads. Barangay and subdivision roads are connected either to MacArthur Highway or to the municipal roads.

3.68 MacArthur Highway runs from south (Monumento) to north such that the same types of vehicles can be observed along its route. Private cars, buses, jeepneys, trucks, commercial vehicles such as vans and pick-ups are the common types of vehicles using the national road. Municipal roads are commonly used by private cars, which passengers have their destinations/residences along the route, and by commercial vehicles and even trucks for trade and other business purposes. Barangay roads and subdivision roads are used by residents' private cars while tricycles are the common means of public transportation along the area.

### **(2) Existing/Ongoing Access Improvement Plan**

3.69 There is a proposed major road project that will connect the eastern part of Metro Manila with Bulacan. This project is called the C-6 Expressway.

3.70 The C-6 Expressway and Global City Link of NLEx between Marilao and Bocaue, Bulacan to Skyway at Bicutan, Eastern Metro Manila and Rizal involves the construction of a 50-km expressway that starts from NLEx at the Bocaue/Marilao boundary, and then through the towns of Sta. Maria and San Jose del Monte in Bulacan, to Rodriguez, San Mateo, Antipolo and Taytay in the province of Rizal, and connects with the Skyway at Bicutan, Taguig. A Global City Link of the C-6 Expressway provides a vital access to commercial and business centers. It is 59.5 km-long (including Global City Access Link Road with a total of 3.0 km), 4–6 lanes, at grade expressway with some elevated portions near Taguig area.

### **(3) Current Land Use**

3.71 The major land use in the vicinity of Marilao Station is residential and commercial. Although SM Marilao is a huge scale commercial facility, most of the other commercial facilities are small shops along the MacArthur Highway and inside the residential area on the west side of the station (see Figure 3.5.3).

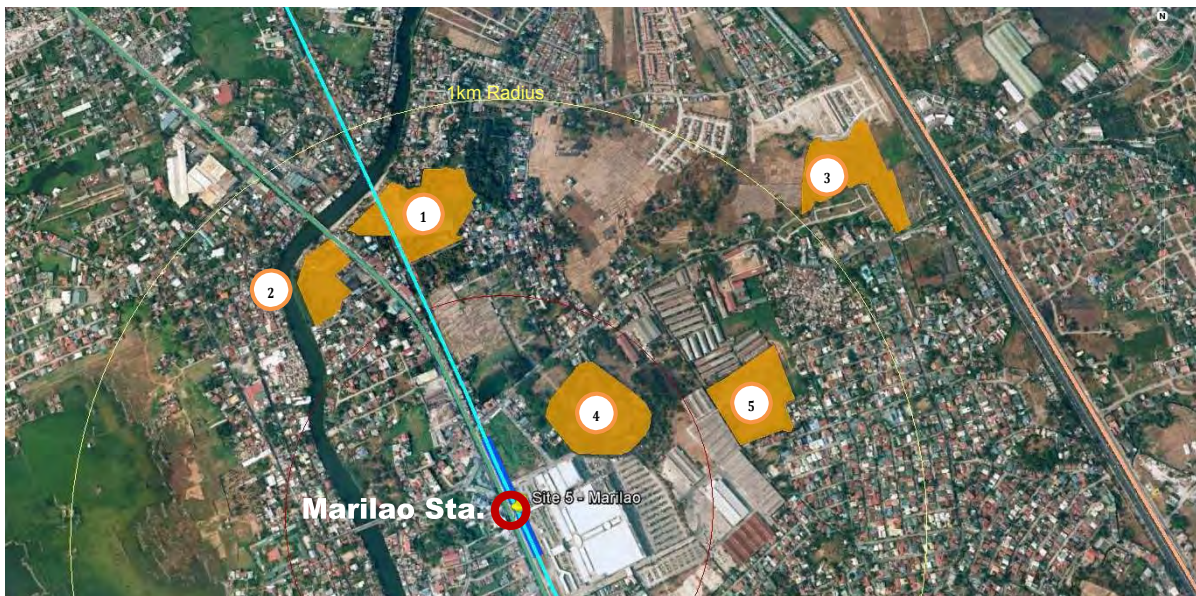




Source: JICA Study Team based on OpenStreetMap.

**Figure 3.5.3 Current Land Use of Marilao Station Area**

3.72 As Figure 3.5.4 and Table 3.5.1 indicate, there are some available vacant lots of about 1 hectare to 4 hectare area within a 1 km radius from Marilao Station, which are small compared to those in the other station areas in Bulacan. Their current land uses are a mix of agricultural, industrial and residential.



Source: Land Use Survey by JICA Study Team.

**Figure 3.5.4 Available Vacant Lots in Marilao Station Area**

**Table 3.5.1 Ownership of Vacant Lots in Marilao Station Area**

Property No. 1)	Barangay	Lot Owner	Area (sq. m.)	Survey/Cadastral Lot No.	Actual Use
1	Saog	Heirs of Dalmacio Villamar rep. by Mario Villamar (widower)	16,576	B	Residential, Unirrigated Riceland
	Saog	Heirs of Dalmacio Villamar rep. by Mario Villamar (widower)	6,832	7	Unirrigated Riceland
	Saog	Heirs of Dalmacio Villamar rep. by Mario Villamar (widower)	6,383	B	Unirrigated Riceland
	Saog	Santiago, Maximo & Angela Santiago (Sps.)	4,432	4-A-3	Residential, Unirrigated Riceland
	Saog	Go, Luisa Joan G., Jasmin Lizette G. Go & Jane Leslie G. Go (all single)	10,105	4-B	Unirrigated Riceland
Sub-Total			44,328		
2	Saog	Laya, Jaime C. & Eleonor C. Laya, Susana C.Laya & Trinidad C. Laya (all single)	19,007	3-B-3	Unirrigated Riceland
3	Lias	Pentagon Steel Corporation	37,314	1-A	Industrial, Agri. Vacant
4	Ibayo	Roxas Realty Corp.	39,555	12	Residential, Unirrigated Riceland
5	Lias	TLL Realty & Management Corporation	30,000	2-A	Industrial
Sub-Total			125,876		
Total				170,204 (sq. m.)	

Source: Land Use Survey by JICA Study Team.

Note: 1) Property No. corresponds with the numbers in Figure 3.5.4.

## 2) Concept Plan

### (1) Issues

3.73 The rail alignment in Marilao is very near, and for most sections, parallel to MacArthur Highway. There are two transport terminals located along this alignment. The station will be located in front of a huge mall (SM Marilao) where a major multimodal transport facility is located. The second major transport terminal is located adjacent to Tabing Ilog Market. The location of this terminal is almost 1.0 km away from Marilao Station. This distance will discourage commuters from transferring to the rail service and, instead, may opt to take other transport modes for their travel. Also, the connectivity of the subdivisions located west of Marilao River will also need to be improved.

3.74 The major inducer of commercial activity in the area is the SM Marilao Mall. There is insufficient number of industrial locators in the area that can contribute additional traffic to the rail system.

3.75 There is also insufficient area for TOD as Marilao has one of the highest population densities in the province with 7,071 persons per sq. km. In addition to this, almost 20% of the city's land area is occupied by fish ponds or aquaculture facilities.

3.76 The elevation of the areas surrounding the station, especially the areas west of Marilao River, ranges from 5 to 10 m only. This makes the area prone to flooding.

### (2) Concept of TOD

3.77 The concept of TOD for the Marilao Station area is the "Catalyst to strengthen commercial and services sector of Marilao". SM Marilao is a major establishment in this area that induces various commerce and service-related activities in the area. Attracting similar locators to the area to convert it to a major commercial hub will promote it as a

major destination in the province. There are various benefits that can be gained from agglomerating similar establishments in one area. This location can be designed to capture the benefits produced by the economics of agglomeration.

### (3) Concept Plan

3.78 The abovementioned issues can be addressed by improving the transport network and attracting additional commercial locators to the area. The key intervention projects proposed to address these issues are as follows (see Figure 3.5.5):

- (i) Additional bridges should link the areas west of Marilao River to the eastern areas where the railway station and commercial establishments are located. A similar east-west road is proposed to be connected to an NLEx service road that is connected to Lias Road;
- (ii) A north-south road is also proposed, creating a road parallel to MacArthur Highway on the east side of SM Marilao;
- (iii) The vacant areas around SM Marilao can be tapped to accommodate similar locators to the area. The area on the west side of MacArthur Highway will be redeveloped to complement the station development plans; and,
- (iv) Parks and green reserve areas can be designed to resolve flooding in low elevation areas. This can also serve as an urban amenity that residents can use.

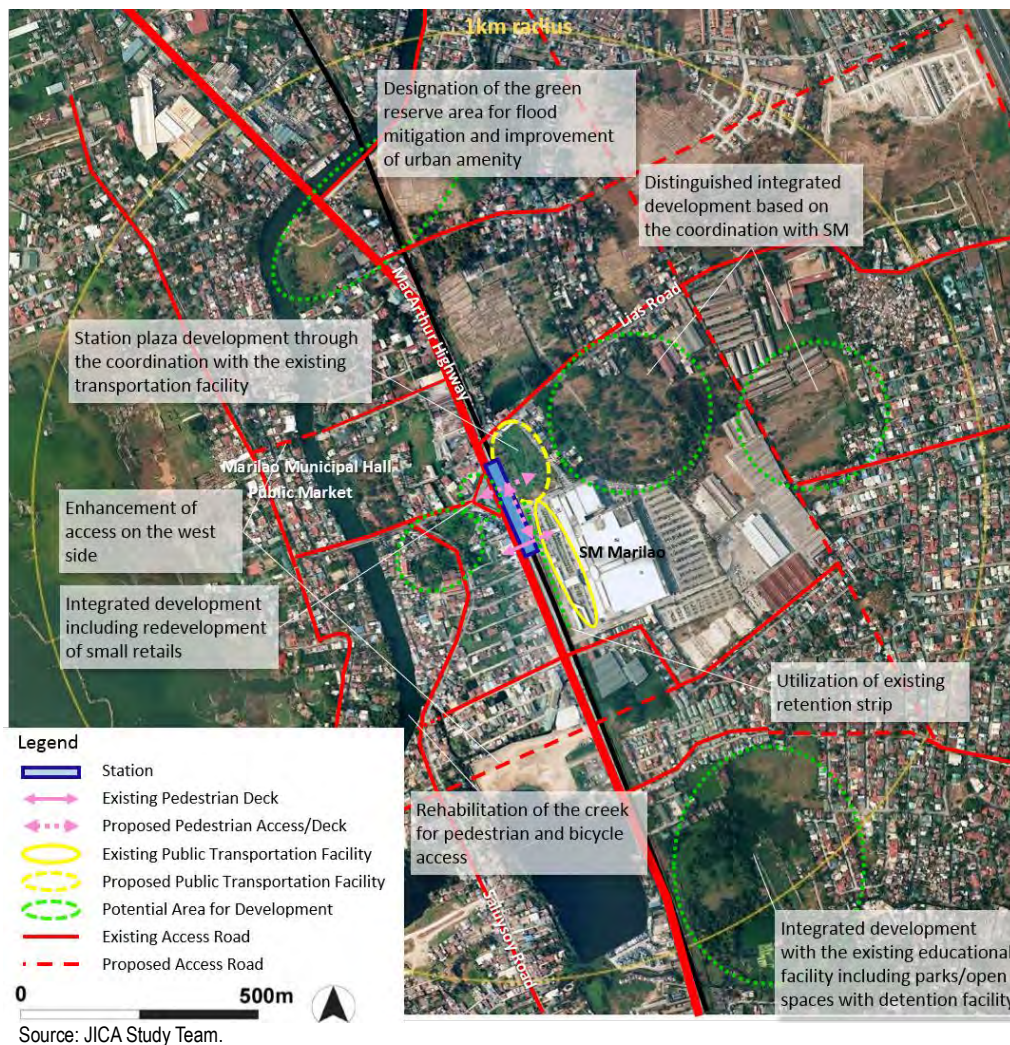


Figure 3.5.5 Concept Plan of Marilao Station Area

### 3) Major Projects/Programs/Action Items

#### (1) List of Projects/Programs/Action Items and Roadmap

3.79 As indicated, projects relevant to the access improvement and public transportation facilities in station area within 200 m from the station need to be implemented by 2020, the start of NSCR operation (see Table 3.5.2).

**Table 3.5.2 Major Projects in Marilao Station Area**

	Project	Type	Term
1	Public transportation facility	Access Improvement	Short-term (by 2020)
2	Access roads within 1 km from the station	Access Improvement	Mid-term (by 2020–2030)
3	Mixed-use facilities within 200m from the station	Integrated Development	Mid-term (by 2020–2030)
4	Mixed-use facilities within 1 km from the station	Integrated Development	Mid- to Long-term (by 2030–2040)
5	Green reserve with retention facility	Mitigation of Flood Risk/Improvement of Urban Environment	Mid- to Long-term (by 2030–2040)
6	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	Improvement of Access and Urban Environment	Mid- to Long-term (by 2030–2040)

Source: JICA Study Team.

#### (2) Preliminary Cost Estimate for Access Improvement Projects

3.80 Among the major projects, preliminary cost was estimated for the access improvement projects (see Table 3.5.3 and **Appendix 5.2** in detail). Coordination with the relevant LGUs and local community will be required to prioritize the projects for implementation.

**Table 3.5.3 Estimated Costs of Preliminary Projects**

	Project	Area (sq. m.)	Cost (PHP 000)
1	Public transportation facility	2,000	6,774
2	Access roads within 1 km from the station	65,000 (W=20 m, L=3,250 m)	347,490
3	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	12,620 (W=3 m x 2 sides, L=2100 m)	29,881

Source: JICA Study Team.

### 3.6 Meycauayan Station

#### 1) Existing Situation

3.81 Meycauayan Station is located southwest of Meycauayan City and also southwest of the Meycauayan City Hall. The station is close to the Marilao Station, about 1.8 km away (see Figure 3.6.1). The average distance between each station is about 4 km. The old station building is still existing; however, its condition is not good. The area is characterized as predominantly lowland, therefore flood often occurs and houses are swamped (see Figure 3.6.2). The major facilities within 1 km from the station are the public market, Memorial Park, and Old Malhacan Church which is a historical heritage site.



Source: JICA Study Team.

**Figure 3.6.1 Vicinity Map of Meycauayan Station Area**



**Old Station Building**



**Local Commercial Strip**



**Flooded Area on West Side of the Station**

Source: JICA Study Team.

**Figure 3.6.2 Surrounding Environment of Meycauayan Station Area**

### (1) Road Network

3.82 Meycauayan Station is served mainly by MacArthur Highway as it is located adjacent to the national road. Main access to the station, however, is made through the municipal road, Malhacan Road, which intersects the MacArthur Highway around 180 m south of Meycauayan Station.

3.83 Malhacan Road proceeds northeast and crosses over the NLEX after which it interfaces with Meycauayan Camalig Road, another municipal road. From NLEX, access is made through Malhacan Road as it intersects with the PNR line. Jeepneys are the main transportation in this road section, mixing with private vehicles and commercial vehicles consisting of vans and pick-ups and cargo vehicles consisting of small to large and heavy trucks. Another municipal road, Requino St., likewise conveys traffic from the different barangays along its route towards the intersection of MacArthur Highway and Malhacan Road.

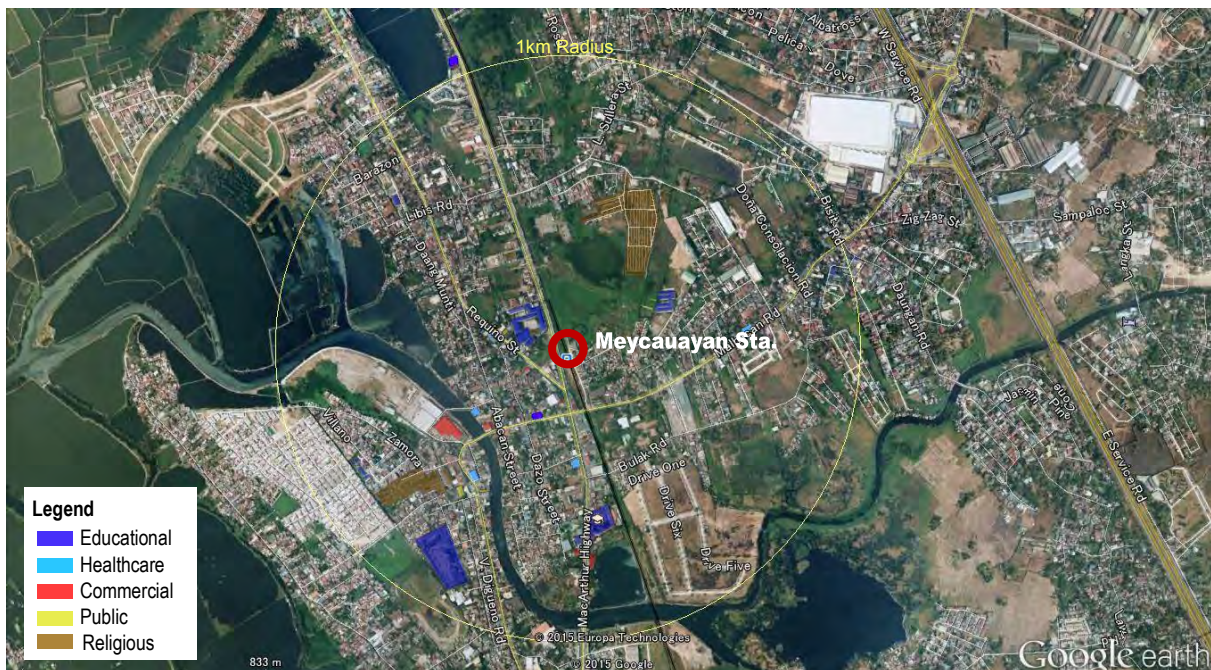
3.84 Barangay roads and subdivision roads are spread around interior areas and have their access through the municipal road or national road. These roads are served by local transportation such as tricycles, while private vehicles are bound for residential areas.

### (2) Existing/Ongoing Access Improvement Plan

3.85 The Manila North Tollways Corp. (MNTC), in coordination with the Local Government of Meycauayan, has planned an access improvement project along Malhacan Road to decongest the existing road and improve mobility of vehicles using the entry and exit ramps of the Meycauayan Interchange of NLEX.

### (3) Current Land Use

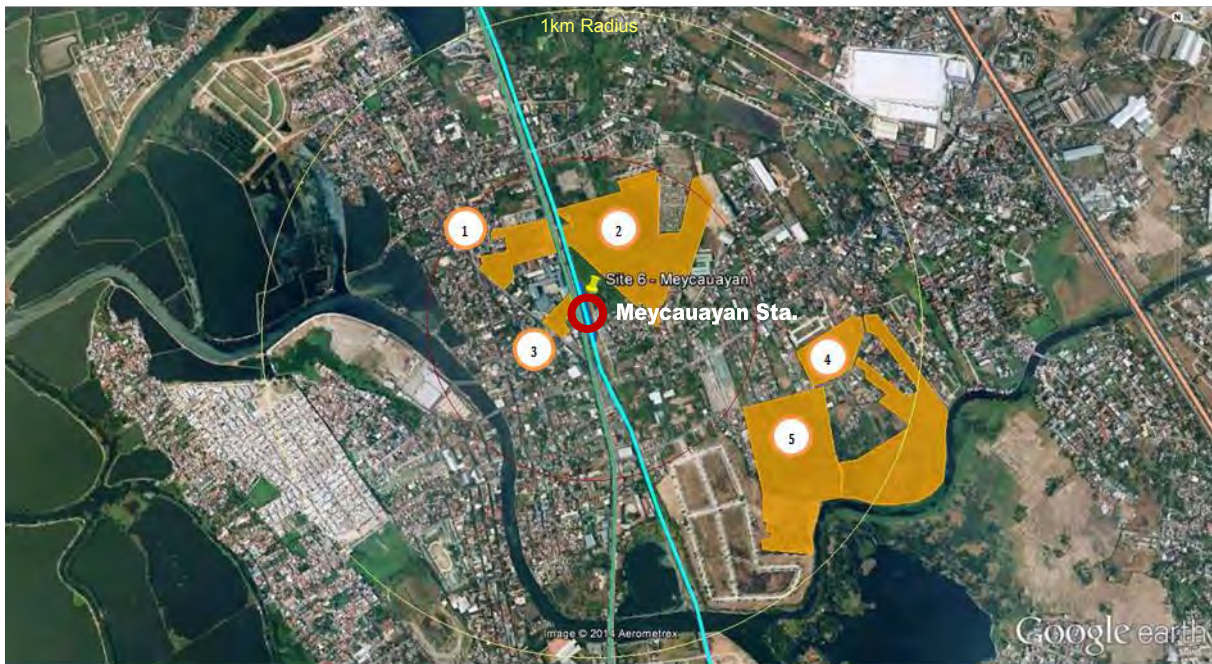
3.86 Lands around the station area are mainly used for residential, industrial, fish ponds and agriculture. The surrounding area is also known as producer of jewelry, footwear, leather goods and tannery. There are several educational facilities within 1 km from Meycauayan Station (see Figure 3.6.3).



Source: JICA Study Team based on OpenStreetMap.

**Figure 3.6.3 Current Land Use of Meycauayan Station Area**

3.87 Figure 3.6.4 indicates that there are some available vacant lots in the area (see also Table 3.6.1). Their current land use is mostly residential.



Source: Land Use Survey by JICA Study Team.

**Figure 3.6.4 Available Vacant Lots in Meycauayan Station Area**

**Table 3.6.1 Ownership of Vacant Lots in Meycauayan Station Area**

Barangay	Lot Owner	Area (sq.m.)	Survey / Cadastral Lot No.	Actual Use
Malhacan	SM Prime Holdings Inc.	338	3021-A	Residential
Malhacan	SM Prime Holdings Inc.	3,308	3021-B	Residential
Malhacan	SM Prime Holdings Inc.	1,212	2-A	Residential
Malhacan	SM Prime Holdings Inc.	1,510	2-B	Residential
Malhacan	SM Prime Holdings Inc.	1,041	2-C	Residential
Malhacan	SM Prime Holdings Inc.	134	2-D	Residential
Malhacan	SM Prime Holdings Inc.	1,203	2-E	Residential
Malhacan	SM Prime Holdings Inc.	1,225	2-F	Residential
Malhacan	SM Prime Holdings Inc.	1,434	2-G	Residential
Malhacan	SM Prime Holdings Inc.	537	1	Residential
Malhacan	SM Prime Holdings Inc.	537	2	Residential
Sub-Total		12,479		
Malhacan	Sta. Cruz, Felicisimo & Rosario Sta. Cruz (Sps.)	368	-	Irrigated Riceland
<b>Lots Reportedly owned by ABS-CBN</b>				
Malhacan	B. Serrano Enterprises, Inc.	60,000	1-B	Residential
Malhacan	Kowloon Realty & Development Corporation	10,901	1-A	Residential
Sub-Total		70,901		
Total				83,748 (sq. m.)

Source: Land Use Survey by JICA Study Team.

## 2) Concept Plan

### (1) Issues

3.88 Meycauayan has experienced a rapid increase in population in the past decade, attaining one of the highest population densities in Bulacan Province with 6,976 persons per sq.km. This is almost seven times the provincial average. This rapid increase in population and the uncontrolled spread of development in the city has led to inappropriate land use conversion. Many developments are inconsistent with past land use plans.

3.89 This area has a well-developed road network. However, access to subdivisions requires improvement. The area located west of Meycauayan River only has one bridge that connects the said area to the areas on the eastern side.

3.90 Several transport terminals at this location are scattered along MacArthur Highway, with the majority located inside mall properties. The major transport terminal is located along Malhacan Road. This terminal occupies an area of almost 8,000 sq. m. This terminal is still within walkable, albeit a bit far, distance from the train station 500 m away.

3.91 Flooding is another issue that requires attention. The elevation east of Meycauayan River is low at 3 to 6 m above sea level. The eastern land areas are a slightly higher with elevations ranging from 5 to 10 m. These low elevation areas are prone to flooding.

### (2) Concept of TOD

3.92 The concept of TOD for the Meycauayan Station area is the “Establishment of a competitive commercial/services sector and redevelopment of transportation facilities”. The commercial corridor along MacArthur Highway, which is parallel to the rail alignment, can be improved by redevelopment of small retail shops in the immediate vicinity. Pedestrian access to the station should be designed to accommodate traffic generated/attracted by the rail line. This pedestrian access should also include a walkway or wider sidewalks to/from the Malhacan Transport Terminal.

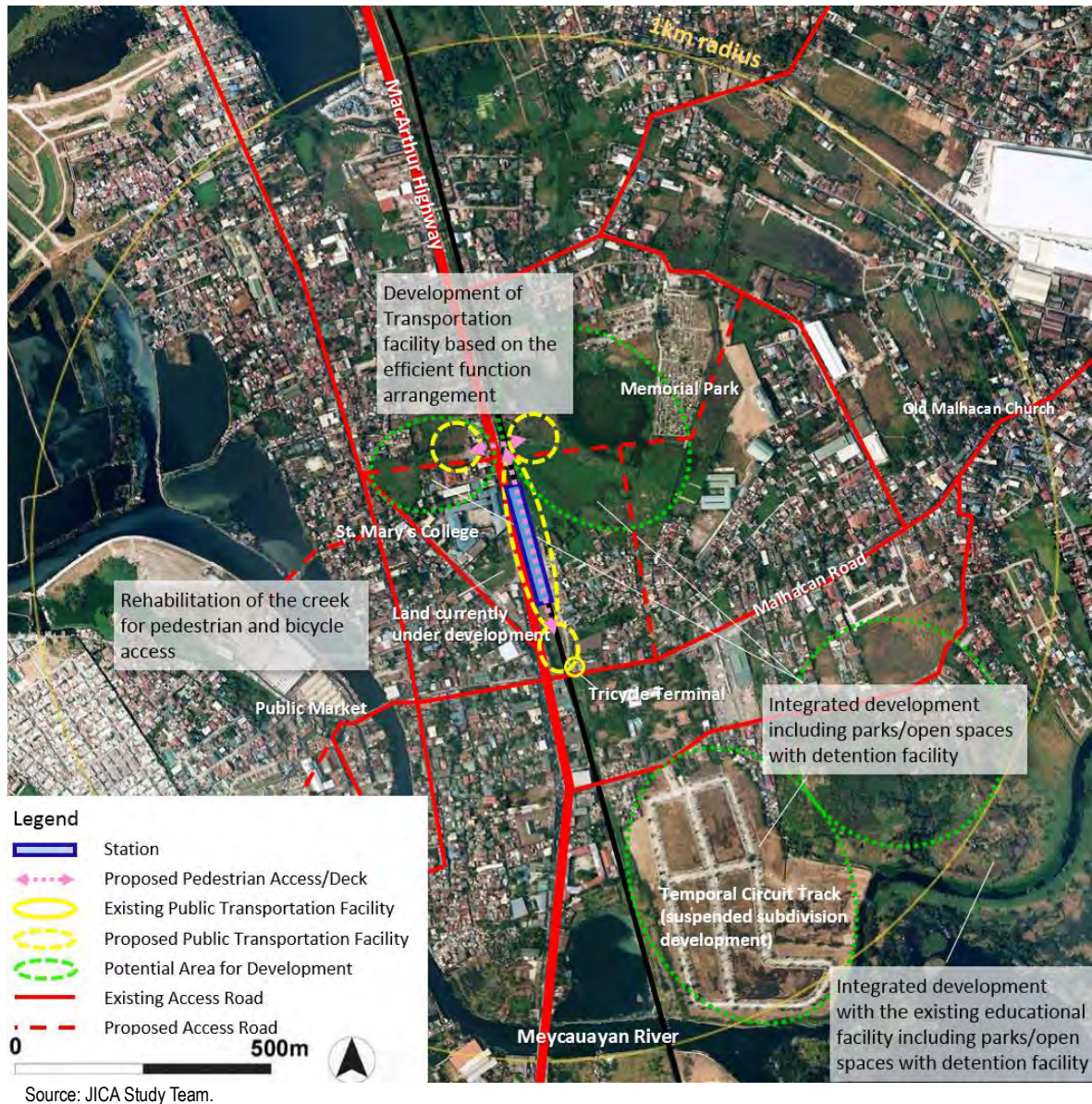
### (3) Concept Plan

3.93 Meycauayan is the first city of Bulacan at the border of Metro Manila, serving as the gateway to the province. The spillover development from Metro Manila first reaches Meycauayan. This unbridled development creates numerous problems for the city. The following key intervention programs are all geared towards solving these problems (see Figure 3.6.5):

- (i) The station area will be developed as an efficient multi-modal transport facility. As the area at this location is limited, the development maybe limited to unloading and unloading bays for some transport modes;
- (ii) Construction of an appropriately designed walkway or sidewalk to/from Malhacan Transport Terminal;
- (iii) The connectivity of the areas west of Meycauayan River to the east will be improved with the construction of two bridges. These bridges will lead to Saluysoy–Abacan Rd on the eastern side;
- (iv) An east-west road traversing MacArthur Highway will be constructed near the station. This will also improve connectivity to the proposed mixed-use complex on the eastern side of the station;



- (v) A mixed-use complex integrated with the NSCR will improve the competitiveness of Meycauayan as a major hub for commerce and service sectors; and,
- (vi) The ongoing land development west of the station will be coordinated with the proposed plans. The traffic generated by this development has to be taken into account in the design of road transport and pedestrian access to the station.



**Figure 3.6.5 Concept Plan of Meycauayan Station Area**

### 3) Major Projects/Programs/Action Items

#### (1) List of Projects/Programs/Action Items and Roadmap

3.94 As indicated, projects relevant to the access improvement and public transportation facilities in station area within 200 m from the station need to be implemented by 2020, the start of NSCR operation (see Table 3.6.2).

**Table 3.6.2 Major Projects in Meycauayan Station Area**

	Project	Type	Term
1	Public transportation facility	Access Improvement	Short-term (by 2020)
2	Access roads within 1 km from the station	Access Improvement	Mid-term (by 2020–2030)
3	Mixed-use facilities within 200 m from the station	Integrated Development	Mid-term (by 2020–2030)
4	Mixed-use facilities within 1 km from the station	Integrated Development	Mid- to Long-term (by 2030–2040)
5	Green reserve with retention facility	Mitigation of Flood Risk/Improvement of Urban Environment	Mid- to Long-term (by 2030–2040)
6	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	Improvement of Access and Urban Environment	Mid- to Long-term (by 2030–2040)

Source: JICA Study Team.

## (2) Preliminary Cost Estimate for Access Improvement Projects

3.95 Among the major projects, preliminary cost was estimated for the access improvement projects (see Table 3.6.3 and **Appendix 5.2** in detail). Coordination with the relevant LGUs and local community will be required to prioritize the projects for implementation.

**Table 3.6.3 Estimated Costs of Preliminary Projects**

	Project	Area (sq. m.)	Cost (PHP000)
1	Public transportation facility	7,000	23,709
2	Access roads within 1 km from the station	37,700 (W=20 m, L=1,885 m)	201,235
3	Rehabilitation of the creeks with pedestrian walkway and bicycle lane	20,040 (W=3 m x 2 sides, L=3340 m)	47,434

Source: JICA Study Team.

### 3.7 Valenzuela Station

#### 1) Existing Situation

3.96 Valenzuela Station is located on the northwest of Valenzuela City in Metro Manila and northwest of Valenzuela City Hall as well. The city hall is far from the station, at a distance of 2 km. The station is between NLEX and MacArthur Highway (see Figure 3.7.1). The old station building is still existing (see Figure 3.7.2). The major facilities within 1 km from the station are Valenzuela Memorial Park, and Dalandanan National High School. The station area is prone to floods.



Source: JICA Study Team.

Figure 3.7.1 Vicinity Map of Valenzuela Station Area



Old Station Building



MacArthur Highway



Residential Area at North Side of the Station

Source: JICA Study Team.

Figure 3.7.2 Surrounding Environment of Valenzuela Station Area

## (1) Road Network

3.97 Valenzuela Station is surrounded by a mix of residential, commercial, institutional and industrial developments along its periphery. Obviously, such developments are accompanied by the creation of a road network system, though complicated and unplanned. The station is at the confluence point of MacArthur Highway, Governor Santiago St., and Maysan Road.

3.98 Access from NLEX is through the Valenzuela Interchange and Malhacan Road. On the other side, the road interfaces with Paso de Blas Road, which interfaces with General Luis and proceeds to Quirino Highway towards Novaliches.

3.99 The rest are barangay and subdivision roads intersecting the national road at various locations.

## (2) Existing/Ongoing Access Improvement Plan

3.100 The Valenzuela Station area will be traversed by the proposed North Luzon Package: Manila North Road (Monumento–Agoo/Aringay Boundary), La Union, Bulacan, Pangasinan which involves asphalt overlay and maintenance on the intermittent section of the existing 233.3 km road.

3.101 Another expansion project is being undertaken by MNTC, which will add to the road network in Valenzuela. This project is the completion of Segment 8.2 of NLEX, implementation of which was delayed due to ROW problems.

## (3) Current Land Use

3.102 Since the major industry in Valenzuela Station area is manufacturing, the surrounding lands are mainly used for residential and industrial purposes. Valenzuela Memorial Park (8 hectare) occupies a big lot northeast of the station (see Figure 3.7.3).

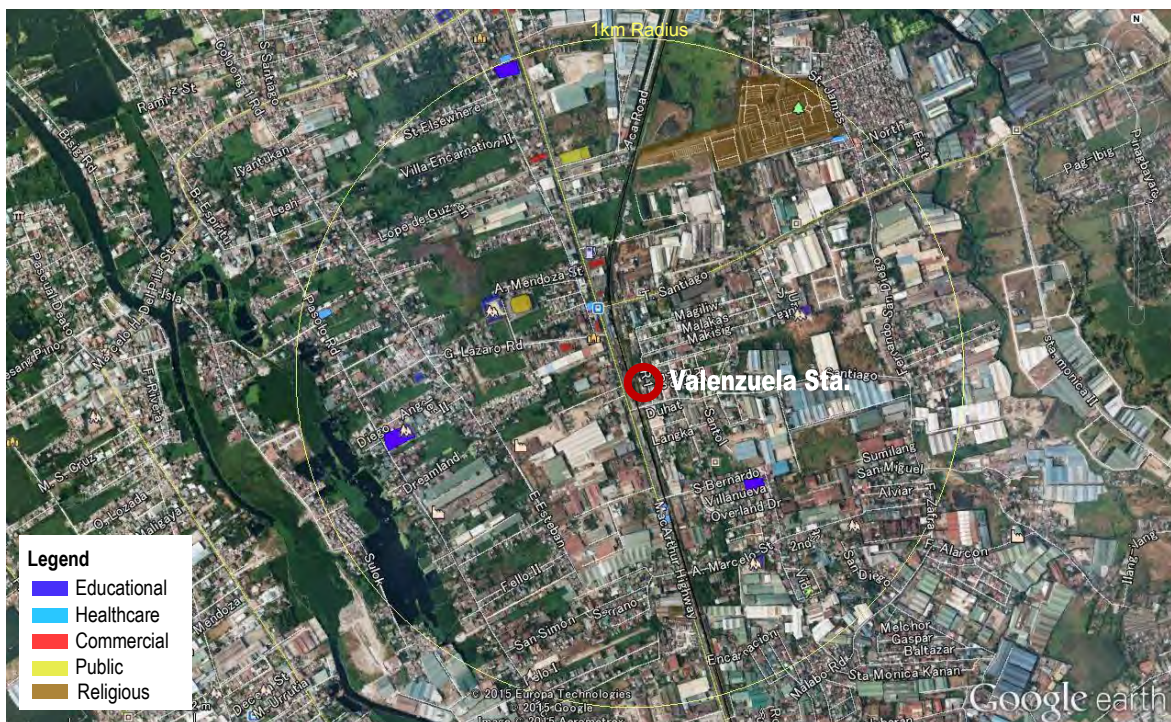


Figure 3.7.3 Current Land Use of Valenzuela Station Area

3.103 There are several vacant lots on the south and west of the station (see Figure 3.7.4) of about 0.5 hectare to 11 hectare size. Their current land use are commercial, industrial, residential and agricultural (see Table 3.7.1).



Source: Land Use Survey by JICA Study Team.

**Figure 3.7.4 Available Vacant Lots in Valenzuela Station Area**

**Table 3.7.1 Ownership of Vacant Lots in Valenzuela Station Area**

Property No. 1)	Barangay	Lot Owner	Area (sq. m.)	Survey / Cadastral Lot No.	Actual Use
1	Saluysoy	Cabral, Victoria P.	11,282	Lot 3	Commercial, Raw land
	Saluysoy	Philippine National Bank	6,041	Psu-148818 Lot1	Commercial
	Saluysoy	Escoto, Manuel B. m/to Luz Tangonciang	3,924	Psd-03-0100871 Lot 1	Commercial
	Saluysoy	Escoto, Rufino B. (single)	2,324	Psd-03-0100871 Lot 3	
	Saluysoy	Escoto, Rufino B.(single)	1,600	Psd-03010087 Lot2	Commercial
Sub-Total			25,171		
2	Malhacan	B. Serrano Enterprises, Inc.	60,000	1-B	Residential
	Malhacan	Bordador, Renato B. m/to Teresa Pulido;Violeta B. Villacorta (single), et. Al.	18,886	Q-9-C	Irrigated Riceland
	Malhacan	Montaos, Ignacio, et. Al.	11,364	3098	Irrigated Riceland
	Malhacan	Kowloon Realty & Development Corporation	10,901	1-A	Residential
	Malhacan	Ypapo, Wilfredo S. Rev. & Fidel S. Ypapo (both single)	9,103	-	Irrigated Riceland
Sub-Total			110,254		
3	Calvario	Walled City Securities Corp.	2,381	1-B-1	Commercial, Residential
	Calvario	Walled City Securities Corp.	2,381	1-B-2	Commercial
	Calvario	Walled City Securities Corp.	1,228	1-A-1	Residential
Sub-Total			5,991		
4	Malhacan	Francia, Cecilia P. m/to Fernando Zamora	5,872	4432-E-2-1	Raw land
	Malhacan	Francia, Benjamin P. (single)	7,791	4432-D	Raw land

Property No. <sup>1)</sup>	Barangay	Lot Owner	Area (sq. m.)	Survey / Cadastral Lot No.	Actual Use
	Malhacan	Francia, Amos P. Jr. (single)	5,488	4432-C	Raw land
	Malhacan	Francia, Benjamin P. et. Al.	4,031	2	Agri. Vacant
Sub-Total			23,182		
5	Malhacan	Phil. Pipes & Merchandising Corp.	29,072	-	Residential, Industrial
	Malhacan	Francia, Antonio M. (single)	27,895	4417-B	Residential, Irrigated Riceland
	Malhacan	Felicisimo Sta. Cruz Inc.	26,199	3	Irrigated Riceland
	Malhacan	Saint Catherine Realty & Dev. Corp.	23,828	-	Irrigated Riceland
	Malhacan	Domingo S. Jose Inc. (Beneficial Owner)	23,000	4430-A	Agri. Vacant
	Malhacan	Francia, Benjamin P. et. Al.	17,560	-	Raw land
	Malhacan	Del Castillo, Fidela m/to Eulalio Mistica	12,035	-	Agri. Vacant
	Malhacan	Municipality of Meycauayan	15,000	3-C	Industrial
	Malhacan	Municipality of Meycauayan	5,000	4-B	Industrial
Sub-Total			179,589		
Total				344,187(sq. m.)	

Source: Land Use Survey by JICA Study Team.

Note: 1) Property No. corresponds with the numbers in Figure 3.7.4.

## 2) Concept Plan

### (1) Issues

3.104 Valenzuela is located inside Metro Manila, right at the border between Metro Manila and Bulacan Province. This is a heavily populated area with very limited land for new developments. It is also heavily occupied by manufacturing industries. As of 2005, almost 2/3 of the total manufacturing locators in Metro Manila were in Valenzuela. This leaves the city with very little area for other types of development, such as residential complexes. Even for the station plaza, the narrow strip of land alongside MacArthur Highway is deemed insufficient to accommodate vehicle and pedestrian traffic that will be attracted by the NSCR.

3.105 The area is also prone to flooding. The surface runoff in Valenzuela City is diverted to different rivers and tributaries crossing the city. However, the city only has an average surface gradient of 0.55% and an average elevation of 2 m above sea level, which makes the area prone to flooding.

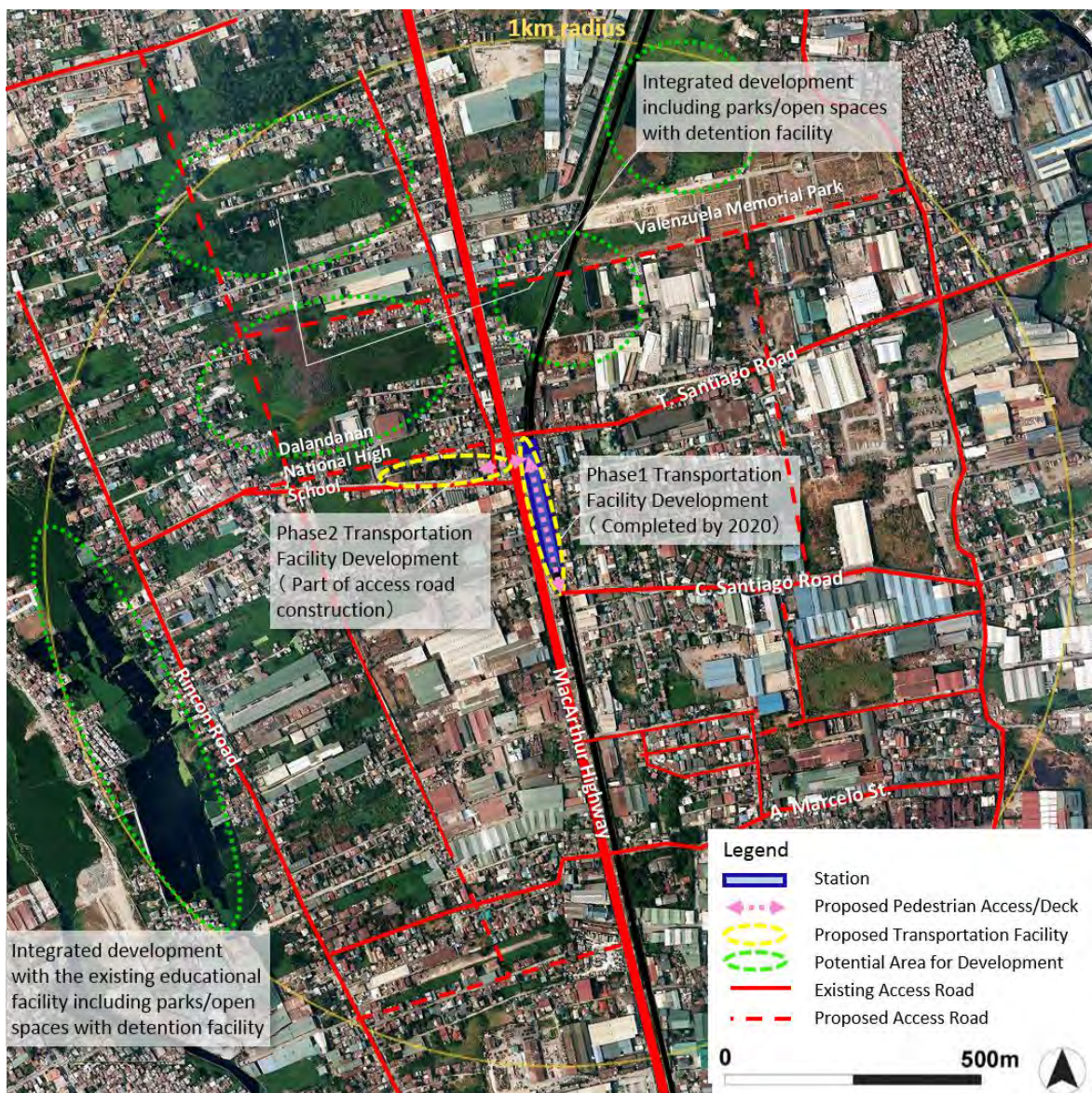
### (2) Concept of TOD

3.106 The concept of TOD for the Valenzuela Station area is the “Development of a station area to facilitate gradual transformation of the communities for a more transit-oriented land use”. The station is located on a strip of land that is bounded by MacArthur Highway on the west side and low-density residential areas on its eastern side. There are several pockets of land located north of the station that are candidate areas for integrated development including parks/open spaces. These candidate areas can be gradually developed once the station area is fully developed to accommodate the additional traffic that can be generated by these integrated developments. There will be a two-phased development for the transport facility at the station area.

### (3) Concept Plan

3.107 The key programs proposed for this area are geared towards improving access to the station. After the road transport infrastructure improvement, the development of unoccupied lands for a more transit-oriented land use will commence. In detail, the proposed key intervention projects are the following (see Figure 3.7.5):

- (i) First is to develop an efficient/effective access to the NSCR station. The proposed road network will improve the overall connectivity of the surrounding areas. This network will consist of a series of east-west and north-south roads that are parallel to the existing major roads;
- (ii) The improvement in the road infrastructure should be complemented by a rerouting scheme for PUJs that will improve general transport efficiency of the area;
- (iii) Pedestrian access to the station is likewise proposed for improvement. Sidewalk improvement programs and construction of walkways and pedestrian overpasses over critical locations leading to the station area are few examples of projects that can promote non-motorized access to the station; and,
- (iv) The second stage of development after the transport network upgrade is the gradual implementation of integrated development on several tracts of vacant land. These developments can be mixed-use residential/commercial development with park and/or open space component. These parks/open spaces can be designed to include a water retention feature that can mitigate flood incidences.



Source: JICA Study Team.

**Figure 3.7.5 Concept Plan of Valenzuela Station Area**

### 3) Major Projects/Programs/Action Items

#### (1) List of Projects/Programs/Action Items and Roadmap

3.108 As indicated, projects relevant to the access improvement and public transportation facilities in station area within 200 m from the station need to be implemented by 2020, the start of NSCR operation (see Table 3.7.2).

**Table 3.7.2 Major Projects in Valenzuela Station Area**

	Project	Type	Term
1	Public transportation facility (phase 1)	Access Improvement	Short-term (by 2020)
2	Public transportation facility (phase 2)	Access Improvement	Mid-term (by 2020–2030)
3	Access roads within 1 km from the station	Access Improvement	Mid-term (by 2020–2030)
4	Mixed-use facilities within 1 km from the station	Integrated Development	Mid- to Long-term (by 2030–2040)
5	Green reserve with retention facility	Mitigation of Flood Risk/Improvement of Urban Environment	Mid- to Long-term (by 2030–2040)

Source: JICA Study Team.

#### (2) Preliminary Cost Estimate for Access Improvement Projects

3.109 Among the major projects, preliminary cost was estimated for the access improvement projects (see Table 3.7.3 and **Appendix 5.2** in detail). Coordination with the relevant LGUs and local community will be required to prioritize the projects for implementation.

**Table 3.7.3 Estimated Costs of Preliminary Projects**

	Project	Area (sq. m.)	Cost (PHP 000)
1	Public transportation facility (phase 1)	4,000	13,548
2	Public transportation facility (phase 2)	4,000	13,548
3	Access roads within 1 km from the station	99,100 (W=20 m, L=4,955 m)	528,975

Source: JICA Study Team.