Chapter 6. Environmental and Social Considerations

6.1 Current status of the natural and social environment

6.1.1 Topography and geology

DKI Jakarta (below, "Jakarta") is located in a tropical monsoon region. The temperature does not vary widely over the course of a year. The climate is characterized by a definite dry season (July to October) and a rainy season (November to June), and annual rainfall is reported to range from 1,700 to more than 1,900 mm. Winds are gentle throughout the year and are predominantly north-northwest and north-northeast winds (see Figure-6.1.1).

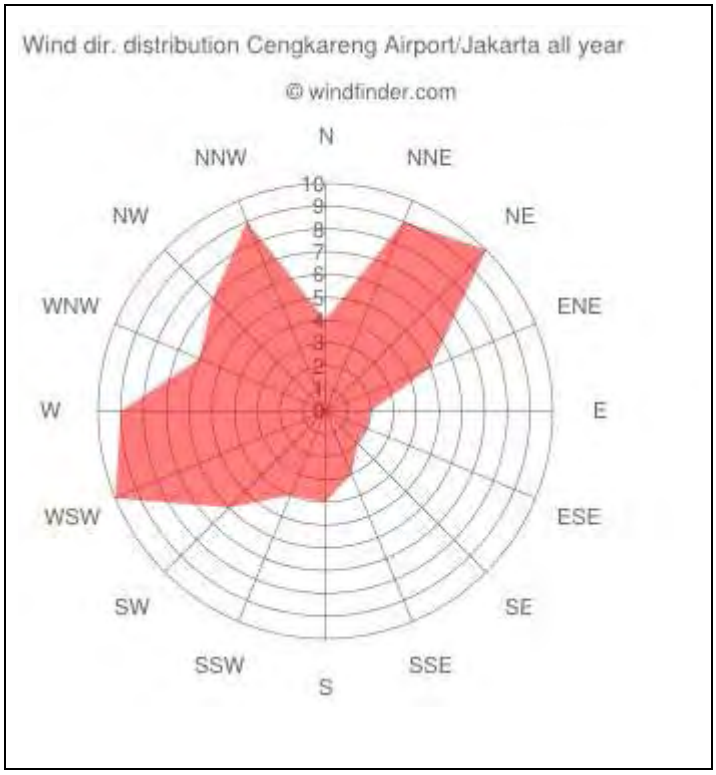


Figure-6.1.1 Wind direction and speed data for Jakarta（Cengkareng Airport, Jakarta）

Note: Prepared based on observational data for October 2009-May 2012 (Time of observations: Daily, 7:00 a. m.-7:00 p. m. local time).

Wind speed is displayed in knots (1 knot = 0.514 m/s)

（Source: : http://www.windfinder.com/windstats/windstatistic_cengkareng_airport_jakarta.htm）

Jakarta is underlain by Quaternary deposits from the relatively high elevation of the southern part of the city to the vicinity of Banjir Kanal in the north (change in elevation of approximately 50 m). There is a relatively hard substratum, located near the earth's surface in the southern part; but this substratum is sloped toward the north, and an aquifer stratum lies on top of it at a thickness of over 300 m. Ground water recharged in the southern part flows mainly down toward the north along this aquifer stratum. There are no large rivers running through Jakarta, so the city has to rely on ground water for its water resources.

The presence of fertile Pleistocene sediment has also been noted, and the presence of an impermeable layer of alluvial clay soil has been reported near the surface. The plan area is located on flat terrain at 10 m above sea level, about 9 km inland to the south of the Port of Jakarta.

6.1.2 Current land use situation

Jakarta is composed of five cities (kota) and one regency. The plan area is located in central Jakarta, a mixed area of office buildings, banks, small shops, markets, hotels, and other commercial facilities, as well as embassies, residential areas (including some high-grade residential neighborhoods), and mosques. (See Figure-6.1.2.)

In the lower right foreground is Mohammad Husni Thamrin Street (currently a TransJakarta route), and in the central right is Sudirman Station building.

Blora Street (direction of Sudirman Station). The photo on the left shows a one-way route located on the left side of Mohammad Husni Thamrin Street (currently a TransJakarta route). A portion of the walkway to the MRT station is planned to be built here.

The interior of a market next to Sudirman Station.

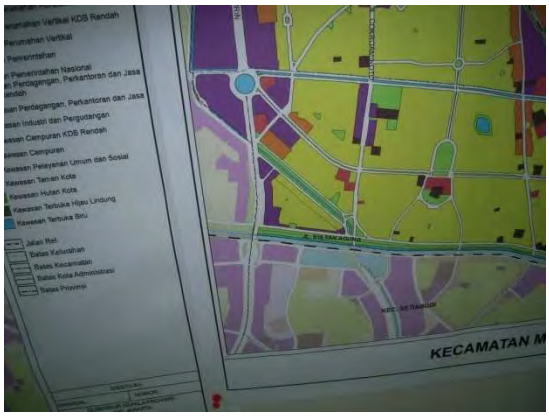
A residential area near Sudirman Station.

Source: Study Team; photos taken in June 2012

Figure-6.1.2 Situation of the plan area location

Figure-6.1.3 shows the land use plan for the Dukuh Atas area (target year 2030). This indicates that future plans for Jakarta call for mixed use with mainly high-rise residential buildings, commercial facilities, and places of business, etc.

Mohammad Husni Thamrin (west side of the current TransJakarta route)



Mohammad Husni Thamrin (east side of the current TransJakarta route)

Note: Purple denotes commercial and office areas, light purple denotes commercial and office areas (KDB Rendah), pale yellow denotes high-rise residential buildings, and light green denotes city parks and green areas. (Source: Study Team, DKI City Planning Department, photos taken in June 2012 at the Jakarta urban planning exhibition hall)

Figure-6.1.3 Land use plan for the Dukuh Atas area (2030)

A TransJakarta BRT route runs through this area in a north-south direction; a railway runs east-west along the canal; and there is a concentration of major public transportation facilities including Sudirman Station (Pt KAI) and Landmark Sudirman Bus Terminal. With these facilities as bases, there is popular use of feeder buses, taxis, motorcycle taxis, bajaj (three-wheeled motorized taxis), and so on, and there are also many street vendors selling food and drink, etc. A mass rapid transit system (MRT; total length of 14.5 km, to open in 2016) is currently planned in the north-south direction, and this subway station lies within the plan area. In addition, an airport railway line is planned with a three-dimensional elevated structure over the existing railway; and in parallel with a flood control waterway, there are plans for an urban expressway on the north side of the waterway and a monorail on the south side of the waterway.

There are illegal squatter settlements along the existing railway. The area has no historic structures, historic sites, nature preserves, or scenic landscapes that should be protected. Also, there is a flood control waterway parallel to the existing railway for urban flood control (waterway width of approximately 40 m, design flow rate of 500 m3/sec.; the riverbank was reinforced in 2004 through sheet pile placement), and there are several flood basins and drainage pump stations along the waterway. (See Figure-6.1.4). Regular inspections of the water quality in the waterway are conducted at major points within the city, and measurements are conducted at two locations upstream and downstream in the area of the planning site (Figure-6.1.5). It is reported that some of the sediment in the waterway contains arsenic and other heavy metal pollutants (PU, personal communication, 2012).

Flood control waterway, parallel to the existing railway tracks

A urban flood basin on the west side of the plan area. There is also an equipment operation station near the flood control waterway.

Source: Study Team; photos taken in June 2012

Figure-6.1.4 Urban flood control facilities

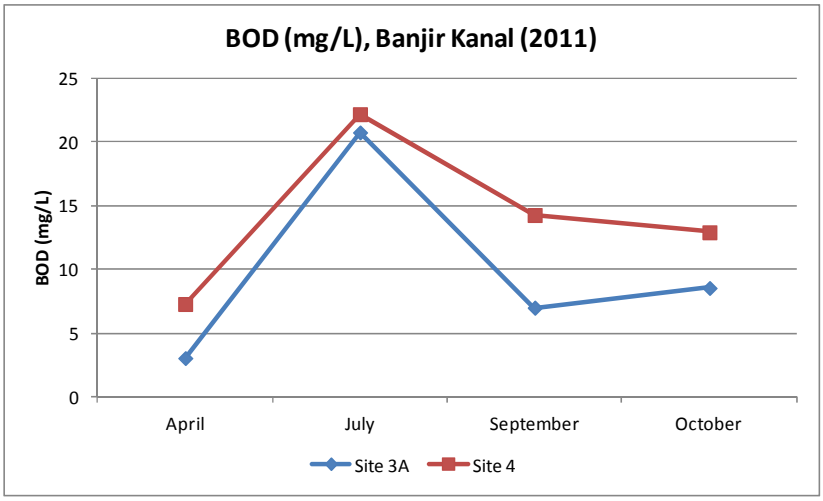


Figure-6.1.5 Results of Banjir Kanal water quality inspection (BOD, 2011)

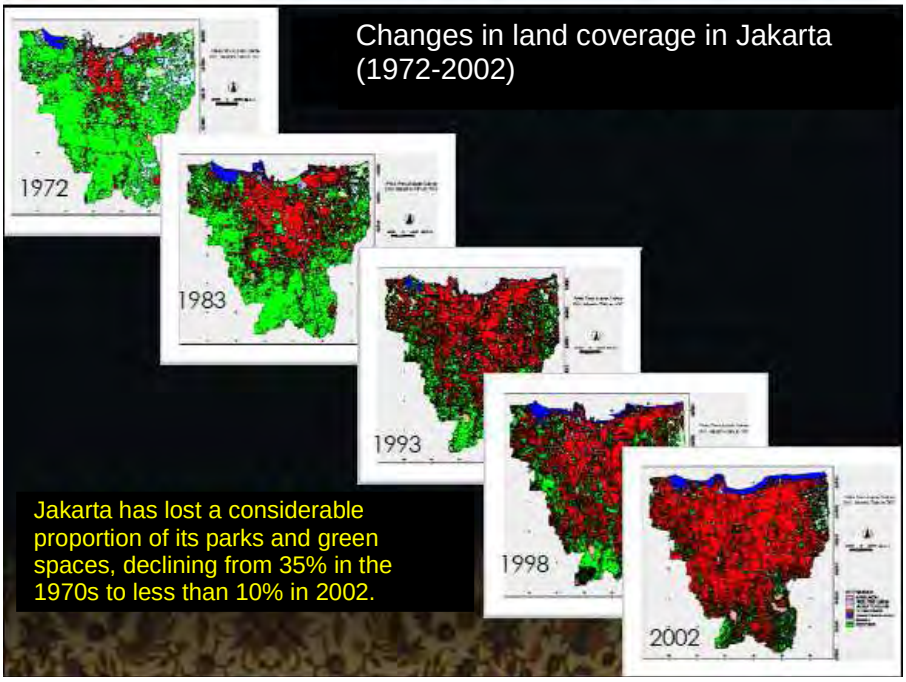
Note: Site 3A and Site 4 are near the intersection of the canal with Madiun Street (approximately 1,200 m upstream from the Thamrin Bridge) and the intersection of the canal with Kyai Haji MasMansur Street (approximately 800 m downstream from the Thamrin Bridge), respectively. The BOD environmental standard in Indonesia is 10 mg/L. (Source: DKI Jakarta Regional Environment Agency)

6.1.3 Urban space development and urban greening

In 1971, the Jabodetabekjur development planning agency was established by all of the local governments in the greater Jakarta metropolitan area. Since then, this agency has engaged in planned development of DKI Jakarta. Jabodetabekjur conducts planning with consideration for emphasizing regional unity, optimal use of space in the region, coordinating the spatial plans of local governments, sharing basic spatial use data, developing road maps for future use of spaces, designation of special economic zones with an eye to overall development of the regional economy, and social welfare aspects of spatial planning.

The Jabodetabekjur spatial plan for the entire metropolitan area was adopted in 2008 (Presidential Regulation No. 54 of 2008). This is a 20-year plan (to be reviewed every five years), and it is being studied as a guide for socioeconomic planning (medium term and long term development plans) in Jabodetabekjur.

In recent years, the significant decrease in green areas in Jakarta has come to be seen as an important urban environmental problem. The figure below shows changes in land coverage in Jakarta from 1972 to 2002. This figure presents a chronological view of the decrease in parks and green areas from 35% in 1970 to less than 10% in 2002.



Source: Ministry of Land, Infrastructure and Transport, 2008

Fig. 6.1.6 Changes in urban green spaces in Jakarta

Under the new Spatial Planning Law (Law No. 26 of 2007), city spatial plans must include plans for allocation and use of green spaces, public transportation and pedestrian networks, and content concerning the informal sector, etc., and at least 30% of city area must be devoted to green spaces (including parks, green paths, and cemeteries). Under the Urban Greening Plan that was implemented beginning in 1993, the planting of a million trees was planned and executed, and in the three years following the start of implementation 2.7 million trees were planted, and it was reported (for example, by Miyamoto and Konagaya, 1999) that 3.47 million trees had been planted by 1997.

6.1.4 Urban disaster risk

Table-6.1.1 shows the risks of natural disasters in DKI Jakarta.

Table-6.1.1 Natural disaster risks in DKI Jakarta

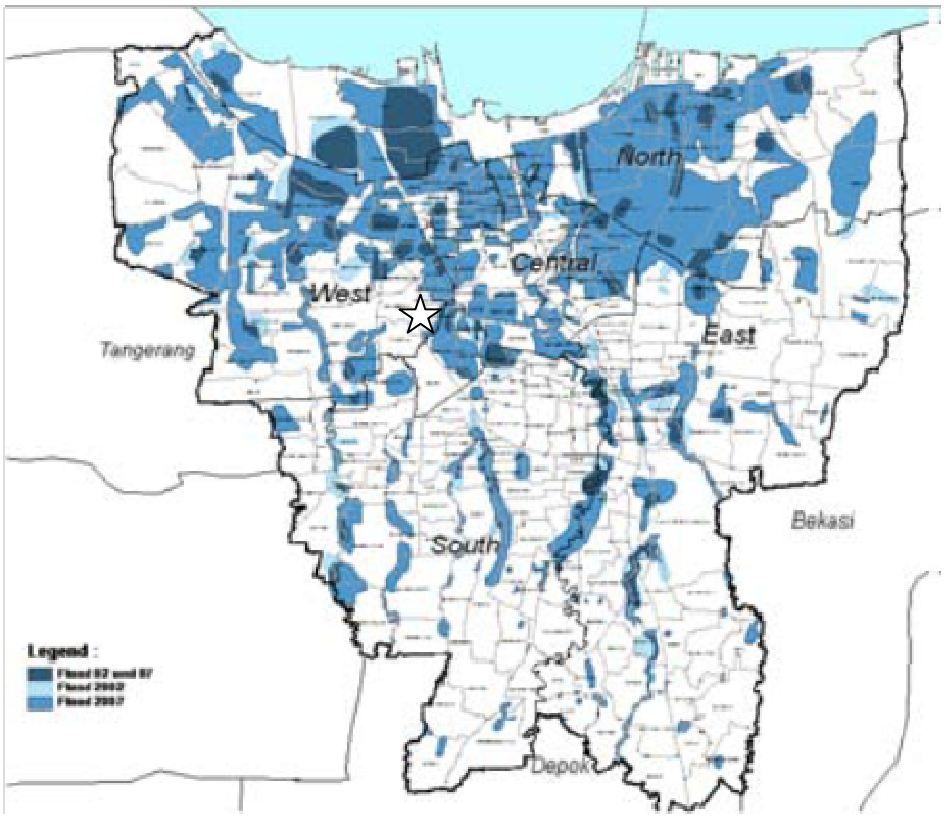
	Type	Risk present?	Past instances
1	Earthquakes	Yes	September 2009, and periodically thereafter.
2	High winds	No	No particularly noteworthy instances.
3	Overflowing, flooding, and inundation by city rivers	Yes	There is a rainy season every year, and recent urban flooding occurred in October 2010. In central Jakarta, 27 urban flood instances were recorded during the three-year period from 2007 to 2009 (Surbakti et al., 2010).
4	Tsunamis, droughts, volcanoes	No	No particularly noteworthy instances.
5	Landslides	No	No particularly noteworthy instances.
6	High tides	Yes	January 2008, and periodically thereafter.
7	Heat island effect	Yes	During the past several years, the average temperature in Jakarta has been increasing.

Source: Prepared by the Study Team, based on
http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/

In DKI Jakarta, urban flooding and overflowing of city rivers have a high likelihood of occurrence during the rainy season every year, followed by earthquake risks. Figures-6.1.7 and 6.1.8 show the situation of damage from urban flooding in DKI Jakarta in 2007 and 1985, respectively.

In the area of Dukuh Atas, which is the area of this project, urban flooding and submergence are reported to occur about once every five years (Study Team, private communication, 2012). Detailed information has not been obtained on maximum depth of submergence, area of submergence, submergence period, or damage conditions, but the tracks of the existing railway were covered by floodwaters. (Note: The platforms and facilities inside the Sudirman Station building were not covered.) Also, it was confirmed by on-site investigation that foundation lifting had occurred in some relatively recently constructed places of business. On the other hand, in the interviews conducted during the site survey, it was learned that in the event of heavy rainfall, severe flooding would occur mainly on the roadways as a result of inadequate local drainage (flooding depth approximately 20-30 cm; no detailed records exist), but that local drainage was conducted comparatively quickly after the rain had stopped (drainage occurred primarily in the Menteng direction) (Study team, 2012). As one part of its urban flood control measures, the Ministry of Public Works (PU) plans to install freeboards approximately 50 cm to 2 meters in height on both sides of the Banjir Kanal, and to dredge the waterway.

Figure-6.1.9 is an earthquake hazard map of the entire Southeast Asian region (as evaluated under the Global Seismic Hazard Assessment Program (GSHAP)). This figure shows that Jakarta is similar in earthquake risk to the Shikoku and Seto Inland Sea region.



Note: The darkest blue areas on the map were flooded in both 2002 and 2007. Light blue areas were flooded in 2002, and medium blue areas were flooded in 2007. The star symbol on the map denotes the presumed plan site.

Source: Case studies on mitigating disasters in Asia and the Pacific, http://www.adpc.net/v2007/programs/udrm/promise/INFORMATION%20RESOURCES/Safer%20Cities)

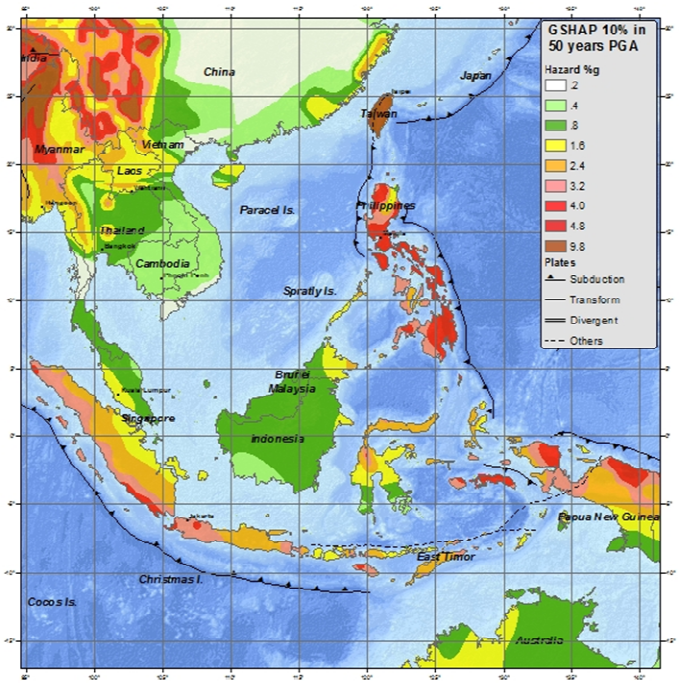
Figure-6.1.7 Area of urban flood damage in 2002 and 2007

Area of flood damage in Jakarta (entire area)

Flood damage in the area of Dukuh Atas

Source: Study Team, DKI City Planning Department, photos taken in June 2012 at the Jakarta urban planning exhibition hall

Figure-6.1.8 Area of urban flood damage in 1985



Note: The legend is based on peak ground acceleration (PGA, %g). Jakarta is at the 4.0%g level, similar to Tokyo or Sendai.

Source: http://earthquake.usgs.gov/

Figure-6.1.9 Earthquake hazard map

6.1.5 Ground water use and ground subsidence

As stated above, ground water from shallow wells is still used in some places in Jakarta. In high-rise buildings, ground water is pumped up from great depths, and there are increasing problems of ground subsidence due to excessive pumping of ground water, accompanied by poor urban drainage and saltwater intrusion into the aquifer stratum near the northern coast. Figure 6.1.8 shows the situation of ground subsidence in the city from December 2002 to September 2005. This indicates that there is ground subsidence of 10 to 12 cm in the area of Dukuh Atas.

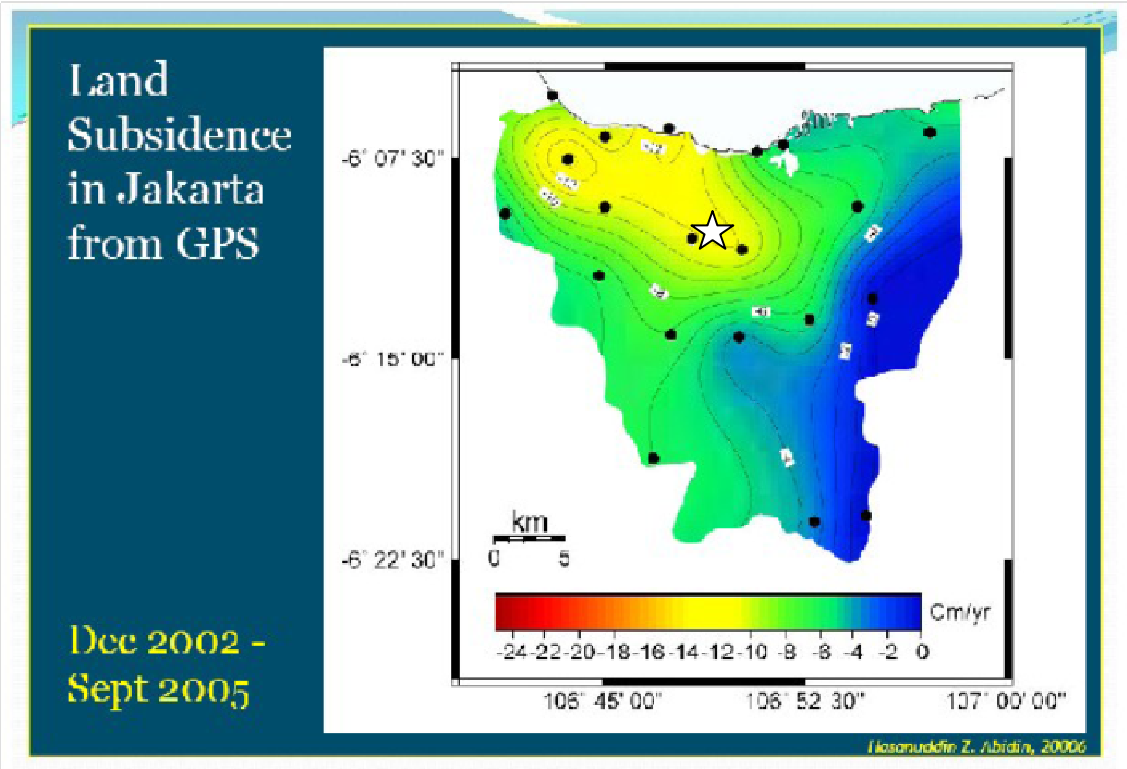
Ground subsidence is still proceeding in the entire Jakarta region, and the Regional Environmental Agency of DKI Jakarta (BPLHD) is currently overseeing wide-area ground subsidence monitoring. Monitoring is continuing at three points in central Jakarta. (See Table-6.1.2.)

Table-6.1.2 Ground subsidence records around central Jakarta (2008-2010)

	Monitoring location	Cumulative ground subsidence (cm)
1.	Gunung Sahari area	11.9
2.	Cempaka Mas area	10.3
3.	Kwitang area	21.7

Note: Locations at which ground subsidence measurements were conducted are shown in Fig. 6.1.10.

Source: Compiled by the Study Team, based on BPLHD reports



Note: The star symbol on the map indicates the presumed plan site.

Source: Jakarta Case Study Overview, http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources

Figure-6.1.10 Situation of ground subsidence in DKI Jakarta from Dec. 2002 to Sept. 2005

6.1.6 Urban transport

There is chronic traffic congestion in the Jakarta capital region. According to official records, the number of motor vehicles has doubled from 1 million to 2 million in the past seven years, and the number of motorcycles has nearly quadrupled from 2 million to 7 million, but road infrastructure development has not kept up with this pace. The problems of noise and vibrations from traffic congestion, as well as automotive exhaust gases, are worsening year by year. Surveys on improving the urban environment have been performed with support from World Bank, JICA, and other organizations.

According to a 2002 JICA survey, annual economic losses due to traffic congestion total approximately ¥66 billion, including approximately ¥36 billion in losses due to motor vehicle operating costs and approximately ¥30 billion due to the value of time lost to commuting. For large cities such as Jakarta, rail service with mass transport capacity is considered to be a promising option. However, it is reported that rail service accounts for only about a 2% share among all means of transportation (utilization rate) in the Jakarta capital region, carrying only about 300,000 to 400,000 passengers per day, as the railway utilization rate has not seen much growth. Urgent measures are needed, including increasing the transport capacity of rail service and increasing the frequency of train service.

The "three-in-one" program was introduced in 1992 as one measure to relieve congestion, requiring all cars entering certain parts of the city to have at least three passengers from 7 to 10 AM and from 4:30 PM to 7 PM.

6.1.7 Air pollution

To reduce air pollution, the Blue Sky Program (Langit Biru, air pollution improvement program) was introduced in 1992. This program consists of two phases. The action plan for Phase 1 (1992 to 1996) included the introduction of new environmental regulations, institutional reforms, capacity building, preparations for air pollution related environmental impact assessments, planning for air quality monitoring, and environmental education (building social awareness). Phase 2 (since 1997) has to do with management of two emissions categories, mobile emissions sources and fixed emissions sources.

The measures indicated for mobile emissions sources include stepwise elimination of leaded gasoline, promoting the desulfurization of diesel fuel, promoting the use of CNG, LNG, and other alternative energies in public transportation, and testing of motor vehicle exhaust gases. The use of unleaded gasoline (completely unleaded) was effected in July 2001 in Jakarta. Air pollution monitoring in Jakarta began in 1985, and the Regional Environmental Agency of DKI Jakarta has established 16 monitoring stations in the city (for sulfur dioxide, nitrogen oxides, carbon monoxide, PM10 particulate matter, and ozone).

6.2 Environmental laws and regulations in Indonesia

6.2.1 Summary of laws and institutions related to environmental and social considerations

In Indonesia, environmental problems have become a priority area addressed by the national government since the State Ministry of Development Control and Environment (Pusat Pendidikan Lungkungan Hidup) was established in 1978. The government is continuously engaged in legislative work related to the environment.

The Environmental Basic Law (No. 04 of 1982) was Indonesia's first environment-related law. In order to prevent the degradation and depletion of environmental resources for future generations and to protect and preserve environmental resources, this law laid a foundation for all efforts to regulate and manage use of the environment. The framework of Indonesia's environmental administration was being built, as the Ministry of Population and Environmental Affairs was established in the following year, 1983, and the Environmental Impact Management Agency (BAPEDAL) was established by presidential regulation in June 1990. The Ministry of Population and Environmental Affairs was divided in March 1993, creating the Ministry of Environment (KLH) as an independent organization for environmental administrative affairs. Under Presidential Regulation No. 77 of 1994, the Environmental Impact Management Agency became an organization for the implementation of environmental administrative affairs directly under the direct control of the president. This established a mechanism whereby the Ministry of Environment performs coordinating functions such as the planning and proposal of policies related to environmental problems, while the Environmental Impact Management Agency implements specific environmental protection measures and pollution countermeasures. Both of these organizations were integrated into the Ministry of Environment by Presidential Regulation No. 2 of 2002 in response to political reforms related to decentralization.

The Environmental Management Act (No. 23 of 1997) was promulgated in September 1997 to replace the earlier Environmental Basic Law. This law stresses the importance of a sustainable environment by giving consideration to waste generation, environmental impact assessment, and

management of hazardous and toxic substances. As a means of environmental management, it places priority on the implementation of environmental impact assessments as a precondition for the issuance of permits for business activities which have a large and serious impact on the environment. Next, in October 2009, the Environmental Management Act was replaced by the Environmental Protection and Management Act (No. 32 of 2009), revising Indonesia's environmental regulations in light of international standards and strengthening regulation while increasing government authority. This new law is currently the legal foundation of environmental protection and preservation in Indonesia, and it recognizes the duty of each citizen to protect the environment and strive to control environmental pollution and degradation.

6.2.2 Environmental impact assessment

For development projects of at least a certain scale, including individual projects, the relevant ministry cooperates with the Ministry of Environment to establish an environmental impact assessment committee (ANDAL committee) including related local government representatives and experts and to conduct an assessment. Depending on the nature of the plan, a decision is made as to whether the committee will conduct the assessment at a central location or the local location. The environmental impact assessment is implemented beginning at the master plan stage, and public involvement is required in the assessment process. (for example, 2009 Environmental Ministerial Ordinance No. 27; see Table-6.2.1).

Table 6.2.1 shows Indonesia's major environmental laws and regulations related to environmental impact assessments.

Table-6.2.1 History of major EIA-related environmental laws and regulations of the Republic of Indonesia

	Regulation	Comments
1	Government Regulation No. 27 of 1999	Provides regulations concerning overall environmental impact assessments by item.
2	Minister of Environment Regulation No. 2 of 2000	Provides guidelines for ANDAL document reviews. Specifically, it clarifies important points for document reviews by ANDAL committees at the central level and the provincial level and their technical teams.
3	Head of BAPEDAL (Environmental Impact Management Agency) Decree No. 8 of 2000	Regulations concerning public involvement and information disclosure during the environmental impact assessment process.
4	Head of BAPEDAL (Environmental Impact Management Agency) Decree No. 9 of 2000	Regulations concerning preparation of terms of reference (ToR) in environmental impact assessment investigations. Here, ToR indicates the scope of environmental impact analyses agreed by the ANDAL assessment committee, etc.
5	Ministry of Environment Decree No. 40 of 2000	Regulations concerning the composition, assignments, duties, procedures, etc., of the assessment committee in environmental impact assessments.
6	Ministry of Environment Decree No. 41 of 2000	Guidelines on establishment of assessment committees by local and regional governments for environmental impact assessment. Regulations concerning assessment committee members, conditions to be met by facilities, persons with authorization to establish a committee, committee composition, etc.
7	Ministry of Environment Decree	Regulations concerning membership of the central government's assessment committees and technical teams in environmental impact assessments.

	No. 42 of 2000	
8	Ministry of Environment Decree No. 17 of 2001	Regulations concerning the types and sizes of projects requiring an environmental impact assessment.
9	Ministry of Environment Decree No. 11 of 2006	Update of regulations concerning projects and activities requiring environmental assessment operations.
10	Ministry of Environment Decree No. 27 of 2009	Guidelines concerning strategic environmental assessments (SEA).
11	Ministry of Environment Decree No. 5 of 2012	Update of regulations concerning projects and activities requiring environmental assessment operations.

Source: Study Team, 2012

6.2.3 Consultations with the Regional Environmental Agency of DKI Jakarta concerning environmental license and permit applications

Consultations with the Regional Environmental Agency of DKI Jakarta were held in June 2012 concerning the procedures for environmental license and permit applications for this development plan proposal, including discussion and confirmation of the necessary matters for study in aspects of environmental and social considerations for the sake of smooth project implementation. The main areas of discussion are summarized below.

1. Environmental license and permit applications: Types of investigation
   Considering the characteristics and spatial scale of the project, it is appropriate to perform a full-scale EIA investigation. The project involves a wide range of components, including underground walkway construction, artificial ground construction, and neighborhood redevelopment, and it is appropriate to perform a comprehensive EIA investigation of all of these components and to summarize the results in related reports. The district is occupied by a mixture of ordinary residents, stores, and offices; so it is important to prepare a resettlement action plan (RAP) in addition to the EIA reports.

2. Environmental license and permit applications: Procedures
   It was requested that applications for the environmental licenses and permits, including preparation of the EIA and RAP reports, be made in accordance with the EAI Law of Indonesia (Government Ordinance No. 27 of 2012). Here, it was requested that an EIA consultant registered with the Indonesian Ministry of Environment be hired for implementation of related investigations including coordination and consultations with the relevant government ministries and agencies and public involvement, etc., starting with determination of ToR for the EIA investigations.

3. Determination of ToR for environmental impact assessment work (EIA)
   The EIA-ToR must be formulated with full consideration for project characteristics and based on full cooperation with related agencies. A special committee is organized to review the content of the (proposed) ToR, and studies are conducted by that committee. At the present time, it is not clear which organization will be in charge, but it may be possible to issue

requests to the Transportation Agency, local community representatives, or environmental and social NGOs, for example. It is not possible to proceed to the next step (EIA and RAP related investigation) until the committee has completed a detailed review and approval of the proposed ToR.

4. Scope of EIA investigation

When performing an EIA investigation, the scope of direct impact and scope of indirect impact based on the plan area (in the case of this project, the underground walkway, artificial ground, and area redevelopment) are determined in accordance with the content of the project. These must be incorporated in determination of the EIA-ToR, and approval must be obtained. Under environment-related legislation in Indonesia, there are no clear provisions concerning the determination of scope; but in EIA investigations for the earlier BRT project, the scope of direct impact was taken as extending 100 m on both sides from the center of the planned route (that is, the scope of direct impact corresponded to a width of 200 m for the entire length of the planned route); and investigation related to environmental and social considerations is required for the determined scope.

5. Investigations related to land expropriation

Indonesia's EIA legislation requires that nearby residents and other stakeholders must be informed concerning the content of the project by way of newspapers, post, and other media at an early stage of environmental license and permit applications. There is a 30-day period for such notification, and if there are no comments, questions, or requests for additional explanations from relevant stakeholders and the local community during this period, the project can be advanced to the next step (ToR determination as described above).

If there are comments, questions, or requests for additional explanations, it is important to promptly prepare and plan stakeholder discussions and explanatory meetings in each district in order to facilitate consensus building with respect to project implementation.

6. Public involvement (PI)

Under Indonesia's EIA legislation, public involvement is only required at an early stage of environmental license and permit application procedures. However, it is desirable to provide multiple opportunities for public involvement throughout the entire investigation period (for example, both before and after implementation of EIA and RAP investigations), since it is quite possible that changes will occur in some portions of the content of the project because of unanticipated circumstances. Particularly in the case of this project, since it is anticipated that there will be large-scale land expropriation, it is important to develop a thorough plan for public involvement, including holding explanatory meetings for local residents, etc. and promptly developing a system for the raising of objections.

7. Other

If construction work for project implementation has not begun by three years after the issuance of environmental licenses and permits, those licenses and permits and the EIA and RAP reports will become invalid.

6.2.4 Green buildings

The standards that must be satisfied in the construction of buildings classified as green buildings are specified by Minister of Environment Regulation No. 8-21 of 2010 on Criteria and Certification of Green Buildings. Buildings meeting these standards are certified as green buildings. As a general rule, this certification is valid for a two-year period, but it can be renewed by following the official procedures.

The Ministry of Environment promulgated this law to promote participation by building owners in sustainable environmental protection activities. At present, constructing a green building is a voluntary decision. However, it is possible that acquisition of green building certification may become a requirement under an environmental protection program.

This law provides the following standards for certification.

1) Use environmentally friendly building materials, such as ecolabel certified materials and local materials.
2) Establish measures, equipment, and infrastructure for the preservation of water resources and water quality, such as hourly water use metering and rainwater utilization systems.
3) Establish measures, equipment, and infrastructure for energy conservation and diversification, such as the use of renewable energy.
4) Do not use ozone depleting substances in air conditioning and fire extinguishing equipment, etc.
5) Establish measures, equipment, and infrastructure for wastewater treatment and treated water supply (reuse of treated wastewater).
6) Establish measures for clear separation of water uses.
7) Provide exclusive areas for sustainable landscaping through the use of natural light and the planning and establishment of outdoor spaces with abundant greenery, rainwater harvesting facilities, etc., and implement building planning and management methods with consideration for microclimates and climate change.
8) Establish measures, equipment, and infrastructure for responding to various types of disasters, such as early warning systems for natural disasters (floods, storms, and earthquakes); and use building materials that have a high capacity for withstanding abnormal weather conditions (such as torrential rains and droughts).

6.2.5 Urban greening

As noted previously (see 6.1), under the new Spatial Planning Law that went into effect in 2007, the greenery preservation ratio in downtown areas is set at 30%. Within the target zone, both banks of the Banjir Kanal (planned site for construction of artificial ground, approximately 150 m x 10 m x 4 = 6,000 m^2) and the west side of Mohammad Husni Thamrin Street (planned site of MRT station construction, approximately 7,000 m^2) are present within the project area, and it is highly likely that the construction in these areas will involve cutting down (or removal and replanting) of trees. In July 2012, discussions were held with the DKI Jakarta Parks Bureau to confirm matters regarding the preservation of greenery in the project area.

1) The figure of 30% downtown greenery preservation established in the new Spatial Planning Law applies to the entire city of Jakarta, not to individual districts.
2) However, if construction is planned in a green area that has been established in urban planning and the likelihood that tree cutting or transplantation within the green area will be required is high, a permit is required for tree cutting (separate from the EIA). Normally, a review period of approximately two weeks is needed after the necessary documents have been submitted before a permit is issued.
3) As a rule, when a single tree is cut, ten new trees must be planted.
4) The concept submitted by the Study Team, of constructing green buildings and establishing new green areas on the artificial ground, is worthy of recognition.
5) An application for a permit to cut trees (approximately 7,000 m^2) for the construction of the MRT Station in the Dukuh Atas area has not yet been received from the project entity.
6) With regard to the MRT, the removal of a considerable number of existing trees in the center of the road will be needed in the elevated section from Lebak Bulus to Semanggi. Discussions regarding this matter have begun.
7) The construction of an urban expressway along the Banjir Kanal is planned (construction is expected to begin in July 2013), and it is highly likely that tree cutting will be needed along the banks of the canal near Dukuh Atas. A study of tree cutting permit application procedures for this project is underway as part of the EIA study for the urban expressway project.

6.2.6 Promoting CSR

Since 1986, it has been mandatory to perform environmental impact analyses, or "Analisa Dampak Mengenai Lingkungan Hidup" (AMDAL), for economic activities accompanying various development projects by the private sector. Environmental impact assessments (EIA) have become mandatory as part of that process. In 1995, the Ministry of Environment introduced an environmental performance evaluation plan for private companies, called "Program Penilaian Peringkat Kinerja" (PROPER). Initially, it was used in assessments for river water quality improvement plans and water pollution control; but the factors for assessment were expanded in 2002, and member companies now perform self-assessment of the environmental impacts of corporate activities including pollution, air pollution, and management of toxic and hazardous waste disposal, in addition to water quality. (There were 1,750 member companies as of 2008-2009.) In addition, member companies are rated, and information on their compliance with environmental regulations is published.

Concerning investment as well, the government enacted Investment Act No. 259 in 2007, requiring all investors to perform suitable environmental protection. In cases of destruction of the natural environment in relation to natural resource development, investors are required to assume stepwise cost burdens for recovery and restoration of the natural environment in the affected areas.

6.2.7 Land laws

The key concepts in land legislation in Indonesia are separation from colonial rule, national unification, and promoting economic development. The background of this legislation includes the national doctrine of overcoming the system of modern ownership rights introduced and established under colonial rule and seeking a pathway to the promotion of economic development.

The Basic Agrarian Law Act, which was enacted in 1960, abolished the Land Act of 1870 and all other land laws from the era of Dutch control, including property rights regulations under the 1848

civil code (except for security rights regulations). In its place, the law established the overriding principle that all national land is subject to state control on behalf of the people, but devised a new private property right or "freehold title" called Hak milik, based on the principle of private use, only to the extent that this does not interfere with societal functioning. In addition, two new rights concepts emerged, the "land cultivation rights title" called Hak guna-usaha, in which land under state control can be used for up to 50 or 60 years for agriculture, forestry, fisheries, or stock farming; and the "building rights title" called Hak guna-bangunan, which provides surface rights for up to 50 years on land under state control or Hak milik. In both cases, use and disposal within the scope of land under state control is only permitted under certain incidental conditions of the state. The most distinctive features of this newly introduced system of land law are that its core private property right, Hak milik, is a right that basically provides security for the lives of private citizens; that the owner coincides with the user as a general principle; and that concentrated acquisition of land is prohibited so that the risks of absentee land ownership (separation between ownership and use) are reduced.

Meanwhile, under economic development policy, new land rights were established as a basis for commercial and industrial development, but these rights are always subject to incidental conditions of the state. It is possible for surface rights and usage rights to be established on top of Hak milik and to pursue commercial and industrial development on such land, but even such cases are indirectly affected by regulations that subject Hak milik to state control and societal demands.

The government of Indonesia has announced the goal of obtaining private investment of US$150 billion for the development of domestic roads, railways, harbors, and other infrastructure during the five-year period from 2010 to 2014. To promote such development, the Land Acquisition Law was established by the Indonesian assembly in December 2011 and put into effect in February 2012 (Law No. 2 of 2012). This law can also be applied retroactively to existing projects in which expropriation procedures are currently underway.

6.2.8 Land Acquisition Law

The Land Acquisition Law, which was put into effect in February 2012, stipulates the implementation of land expropriation in development projects for public purposes according to the following four steps: 1) planning, 2) preparation, 3) implementation, and 4) result delivery. Each of these steps is summarized below.

1) Planning

   In planning for land expropriation, it is necessary to create and prepare Land Acquisition Planning Documentation. This is a report which must state the time (estimated) of land expropriation, the overall work period, the land price (estimated), and matters related to budget plans, etc. This report must be prepared along with a feasibility study on the development project in question. Here, the feasibility study denotes a survey that includes an appropriate socioeconomic investigation, an analysis and comparison of costs and benefits for the surrounding community, an environmental impact investigation, etc. The report must be prepared by the organization that will implement development.

2) Preparation

   Based on the Land Acquisition Planning Documentation that has been prepared, the project's implementing organization can begin the procedures related to land acquisition. In this preliminary stage, it must give public notice of the development plan, collect preliminary data

related to the plan region, and hold an explanatory meeting for residents concerning the development plan.

(1) Public notice of development plan and preliminary investigation

Public notice is given by notifying individuals or using appropriate media, such as newspapers. Preliminary investigations such as data collection should be performed within 30 working days after giving public notice, and it is desirable for the results to be used as informational materials at the explanatory meeting for residents. Households, community residents, groups, institutions, and other parties that will be directly or indirectly affected by the project in question must be invited to the explanatory meeting for residents.

(2) Explanatory meetings for residents

An explanatory meeting for residents must be prepared and held within 60 working days. If there are objections to the development project in question during this period, an additional, complementary explanatory meeting for residents must be held. This additional complementary meeting must be held within 30 working days. After the end of this additional complementary meeting for residents, if there are still any households, community residents, groups, institutions, or other parties who express objections, the project's implementing organization must report this to the DKI or other responsible government organization.

(3) Cause investigation committee

If the explanatory meetings for residents have failed to result in a consensus concerning land acquisition, the responsible government organization which received the report must establish a cause investigation committee. This committee sorts out the problems related to land acquisition negotiations, identifies the issues, and makes proposals on that basis. Within 14 days after its establishment, the committee analyzes and evaluates the suitability of objections raised as motions by households, community residents, groups, institutions, or other parties. Based on the results of the committee's investigation, the head of the responsible government organization (such as the governor) makes an official announcement in writing as to whether the objections raised as motions by households, community residents, groups, institutions, or other parties will be accepted or rejected.

(4) Legal disputes, step 1

Even if an objection to a development project is rejected under the preceding step, deliberations may be continued in the State Administrative Court if the objecting party is dissatisfied with the decision. To do so, the case must be brought before the court within 30 working days after the official written announcement as to acceptance or rejection of the objection under the preceding step. The State Administrative Court must then decide within 30 working days whether to officially accept or reject the complaint.

(5) Legal disputes, step 2

If the objecting party is dissatisfied with the decision of the State Administrative Court, an appeal may be brought to the Supreme Court. To so, the case must be brought before

the Supreme Court within 14 working days after the decision of the State Administrative Court under the preceding step. The Supreme Court must reach a conclusion within 30 working days after official receipt of the appeal. This final decision can provide grounds for continuation of the land expropriation process for the development project in question.

When this process has been completed, disputes and consultations related to land acquisition for the public project at the planning stage are considered to be resolved.

3) Implementation

The project's implementing organization submits a land expropriation implementation plan to the organization in charge of land management administration (official name unknown). This plan must indicate detailed information concerning the landowners in the area for expropriation (such as names, contact information, building types, and land use situation), details concerning compensation, records of negotiations concerning compensation, and whether agreements have been signed. The related price factors that form the basis for calculation of compensation (such as real estate prices, operating profits, and employment contract information) are based on the time when "disputes and consultations related to land acquisition for the public project at the planning stage are considered to be resolved" under the preceding section. The organization in charge of land management administration performs a detailed review of the submitted implementation plan content and then performs the necessary land acquisition procedures.

4) Delivery of the land acquisition results

Upon having ascertained whether all negotiations related to the application for land acquisition were performed appropriately in accordance with the submitted expropriation implementation plan, the organization in charge of land management administration notifies the project's implementing organization that the land acquisition procedures have been completed. Upon receiving such notification, the project's implementing organization may begin construction work.

6.3 Preliminary environmental assessment

6.3.1 Environment of project site

Table-6.3.1. shows the project site details (SD) that form the basis for implementation of screening and scoping in the area where the project is to be located.

Table-6.3.1 Project site details (SD)

Item	Details
Social environment	
Local residents (residents, indigenous people, attitudes to the plan, etc.)	In the vicinity of the plan area, there is an illegal squatter community along the existing railway line. There are no particular reports of minorities or aboriginal peoples. The vicinity of the plan area is an important transportation hub, including a bus terminal of TransJakarta (BRT) and various feeder buses as well as a railway station. Access to nearby commercial areas is expected to increase in the future, and it is feared that chronic

	congestion on main roads and other local streets will continue to worsen if nothing is done; therefore, there is a recognized need for urban redevelopment centered around this transportation hub.
Land use (urban, rural, historic sites, scenic landscape, hospitals, etc.)	The plan area is located in central Jakarta, a mixed area of office buildings, banks, small shops, markets, hotels, and other commercial facilities, as well as embassies, residential areas (including some high-grade residential neighborhoods), and mosques. There are no farm fields or other agricultural land. The area has no historic structures, historic sites, nature preserves, or scenic landscapes that should be protected. There are green bands and parks along the existing railway route.
Economy and transportation (commerce, agriculture/fisheries/forestry, industrial parks, bus terminals, etc.)	TransJakarta (BRT) buses run north-south along Mohammad Husni Thamrin Street; a railway runs east-west along a flood control waterway; and there is a concentration of major public transportation nodes in the vicinity of the plan area, including Sudirman Station (Pt KAI) and Landmark Sudirman Bus Terminal. With these facilities as bases, there is popular use of feeder buses, taxis, motorcycle taxis, bajaj (three-wheeled motorized taxis), and so on, and there are also many street vendors selling food and drink, etc. A mass rapid transit system (MRT; total length of 14.5 km, to open in 2016) is currently planned in the north-south direction, and this subway station lies within the plan area. In addition, there are plans involving a three-dimensional elevated structure over the existing railway for an airport railway line, and for an alternate route on the Serpong-Bekasi line; and in parallel with a flood control waterway, there are plans for an urban expressway on the north side of the waterway and a monorail on the south side of the waterway.
Natural environment	
Topography and geology (steep slopes, soft ground, wetlands, faults, etc.)	The plan area is located on flat terrain (about 10 m above sea level) in the city of Jakarta. During the rainy season, there are problems from chronically poor drainage in the lowlands portion of the Jakarta capital region, and it is reported that past floods have caused temporary inundation and submergence in the vicinity of the plan area.
Valued plant or animal life (nature parks, habitats of specified species, etc.)	The area has no nature preserves or plant or animal life that should be protected. However, under the Jakarta Municipal Land Use Plan (2030), five locations within the target zone have been designated as green spaces (7,000 m^2 + 6,000 m^2 = 13,000 m^2: however, the 7,000 m2 is outside the scope of this project, as it is due to the construction of the new MRT station), and it is highly likely that tree cutting will be required as a result of the construction work.
Environmental hazards	
Occurrence of complaints (environmental hazards, etc. with high levels of concern)	Chronic traffic congestion, urban flooding, poor regional drainage, ground subsidence, and detection of heavy metals such as arsenic in sediment from the flood control waterway.
Response to complaints (institutional measures, compensation, etc.)	Urban flood control measures in the vicinity of the plan area include flood basins and related drainage pump stations in addition to the flood control waterway, but no fundamental solution has been achieved. An urban drainage project led by the World Bank is to begin in 2012. Measures that are being implemented for urban air pollution and ground subsidence are, respectively, wide-area monitoring under an air pollution improvement program and wide-area ground subsidence monitoring since early 2000.
Other particularly noteworthy matters	None.

Source: Study Team, 2012

Based on the study results compiled thus far, a JBIC environmental checklist (abd other infrastructure construction) has been prepared concerning the redevelopment project for the area of Dukuh Atas Station. With respect to environmental checklist preparation and the initial ecological scoping study, based on consultations with the Regional Environmental Agency of DKI Jakarta, implementation of an EIA and RAP survey covering the underground walkway, artificial ground, and area redevelopment has been requested (see section 6.2.3), and related matters have been studied with those investigations in mind. The results are summarized in Table-6.3.2.

Table-6.3.2 Environmental checklist

Category	Environmental matters	Main checklist items	Findings related to environmental considerations
1. Licenses, permits, and explanations	(1) EIA and environmental licenses and permits	① Have environmental impact assessment (EIA) reports, etc., been prepared? ② Have the EIA reports, etc., been approved by the government of the country in question? ③ Were the EIA reports, etc., approved unconditionally? If conditions were added, have those conditions been met? ④ Have any other environmental licenses and permits required by local governing agencies been obtained?	① Not prepared. ② Not approved. ③ Preparation of RAP for the redevelopment project has been requested in addition to the EIA report. ④ When cutting trees, the necessary studies must be conducted and then an application for a permit must be submitted.
	(2) Explanations to local residents	① Have local residents received and accepted suitable explanations concerning the content and impact of the project, including information disclosure? ② Have comments from residents and governing agencies been handled appropriately?	① In this survey, no explanations have been provided to residents. The EAI Law of Indonesia (Government Ordinance No. 27 of 2012) requires information disclosure to local residents and other stakeholders and solicitation of their views concerning the determination of ToR for EIA investigations at an early stage in procedures for environmental license and permit applications (EIA investigations). ② No explanations to local residents are being conducted at the preliminary survey stage..
2. Pollution countermeasures	(1) Air quality	① Are the country's emissions standards and environmental standards met with regard to air pollutants (sulfur oxides (SO_x), nitrogen oxides (NO_x), and particulate matter) emitted from the infrastructure facilities and incidental equipment, etc.?	① Present traffic volume in the vicinity of the plan area is enormous, and some vehicles have abnormal exhaust due to poor maintenance. There are no structures or land features that obstruct local air movement, but it is feared that current roadside air quality does not meet Indonesia's environmental standards. There is also concern that roadside air quality could worsen temporarily during the construction period due to a temporary increase in traffic volume from construction related vehicles, and after the project is complete due to increased traffic volume.

(2) Water quality	① Are the country's emissions standards and environmental standards met with regard to drainage and seepage from the infrastructure facilities and incidental equipment, etc.?	① At present, there are no plans for infrastructure equipment that would require large-scale wastewater treatment. However, it is anticipated that slurry will be generated temporarily from the construction yard (under construction) and underground walkway excavation, and a suitable wastewater treatment plan is needed for that. Also, various proposals could be made concerning future uses of the redevelopment project and artificial ground, and it will be necessary to develop suitable wastewater treatment plans based on those future plans.
(3) Waste	① Are wastes from the infrastructure facilities and incidental equipment, etc., suitably treated and disposed of in accordance with the country's standards?	① It is expected that construction of the underground walkway will involve generation of surplus soil. Also, large amounts of construction waste will be generated as buildings and places of business are removed prior to the area redevelopment project.
(4) Soil contamination	① Are measures taken to prevent pollution of soil and ground water by drainage and seepage from the infrastructure facilities and incidental equipment, etc.?	① Chemical grouting for ground improvement is planned in conjunction with construction of the underground walkway and artificial ground. It is necessary to develop a management system to prevent such chemicals from leaking into ground water or waterways during construction.
(5) Noise and vibrations	① Are the country's standards met with regard to noise and vibrations?	① Present traffic volume in the vicinity of the plan area is enormous, and some vehicles have abnormal exhaust due to poor maintenance. There are no structures or land features that obstruct local air movement, but it is feared that current roadside noise and vibrations do not meet Indonesia's environmental standards. There is also concern that roadside noise and vibrations could worsen temporarily during the construction period due to a temporary increase in traffic volume from construction related vehicles, and after the project is complete due to increased traffic volume.
Ground subsidence	① In cases of pumping large volumes of ground water, is ground subsidence avoided?	① No infrastructure facilities involving the pumping of ground water are planned. However, there is concern about the possibility of unexpected ground water leakage during underground walkway construction, and measures must be devised for resultant declines in area ground water levels and effects on ground subsidence.
Foul odors	① Are there any sources of foul odors? Are there measures to prevent foul odors?	① No infrastructure facilities that could cause foul odors are planned. However, there is concern about the possibility of temporary local submergence due to unexpected drainage problems during construction, which could cause foul odors; and the necessary drainage measures must be taken.

3. Natural environment	(1) Preserves	① Is the site located within any preserve areas under the country's laws or international treaties, etc.? Will the project have any effect on preserves?	① There are no reports of nature preserves under international treaties or Indonesian environmental laws in the vicinity of the plan area. However, under the Jakarta Municipal Land Use Plan (2030), five locations within the target zone have been designated as green spaces (7,000 m^2 + 6,000 m^2 = 13,000 m^2: however, the 7,000 m^2 is outside the scope of this project, as it is due to the construction of the new MRT station), and a permit must be obtained in advance in order to cut trees as part of the construction work.
	(2) Ecosystems	① Does the site include old-growth forests, natural tropical forests, or ecologically important habitats (coral reefs, mangrove wetlands, tidal flats, etc.)? ② Does the site include habitats of valuable species that must be protected under Indonesian law or international treaties, etc.? ③ If there is concern regarding serious effects on ecosystems, are measures taken to reduce ecological impacts? ④ Will water use by the project (surface water and ground water) affect the water environment of rivers, etc.? Are measures taken to reduce impacts on aquatic organisms, etc.?	① There are no reports of valuable plant or animal life in the vicinity of the plan area. ② None. ③ Not applicable. ④ Not applicable.
	(3) Hydrological events	① Will changes in water systems due to the project have adverse effects on surface water or ground water?	① There will be no large-scale topographical changes or earthwork that could impair the current situation of regional drainage and ground water flows. However, it is reported that the vicinity of the plan area has been submerged over wide areas due to past urban flooding, and measures are needed to prevent such floods from entering the underground walkway after its completion. During construction, about 40 pilings will be temporarily built within a flood control waterway, and there is a heightened risk of blocked flow and increased water levels as a result, due to catching of debris and suspended matter in the water channel. Periodic monitoring and measures to prevent large-scale catching of debris are needed during construction. Ground subsidence continues to advance, and continuous monitoring will be needed during construction and after completion concerning the degree of surface deformation.
	(4) Topography and geology	① Will the project cause large-scale topographical or geological changes in the site or surrounding area?	① There are no steep slopes, etc., where landslides could occur in the vicinity of the plan area.

4. Social environment	(1) Relocation of residents	① Will any residents be involuntarily relocated due to project implementation? If so, are efforts taken to minimize the effects of relocation? ② Are suitable explanations concerning relocation and compensation provided in advance to residents who will be relocated? ③ Have investigations for resident relocation been performed, and have relocation plans been developed, including suitable compensation and recovery of livelihood after relocation? ④ Does the plan give suitable consideration to vulnerable persons among the residents who will be relocated, such as women, children, the elderly, the poor, minorities, and aboriginal people? ⑤ Is the consent of residents obtained before relocation? ⑥ Is a system in place for suitable relocation of residents? Is there adequate capacity and budget for implementation? ⑦ Are there plans for monitoring effects after relocation?	① It is anticipated that the residents of approximately 217 buildings will be relocated in order to secure land for the area redevelopment project (confirmed by the results of the preliminary building study performed as part of this study in 2012). This data is based on interpretation of Google Maps images, and these figures may change to some extent with detailed investigation in the future, because some small-scale houses are also found in complicated arrangements in some residential districts. ② At an early stage in the procedures for environmental license and permit applications (EIA investigations), the EAI Law of Indonesia (Government Ordinance No. 27 of 2012) requires information disclosure to local residents and other stakeholders, solicitation of stakeholders' views concerning the determination of ToR for EIA investigations, and explanatory meetings as needed. ③ The EIA and RAP investigations which are planned for future implementation are to include appropriate social surveys and relocation planning on that basis. ④ Same as above. ⑤ The agreement of each household and place of business is to be obtained in the RAP investigation which is planned for future implementation. ⑥ An appropriate implementation framework is to be developed in the RAP investigation which is planned for future implementation. ⑦ A proposal for an appropriate monitoring system is to be developed in the RAP investigation which is planned for future implementation.
	(2) Livelihoods	① Will the project have negative effects on residents' livelihoods? Will any necessary steps be taken to reduce these effects?	① In addition to many homes of private citizens, the planned redevelopment area around the station includes places of business, hotels, bank branches, stores, restaurants, markets, etc. Social surveys will be needed concerning the situation of use of these facilities by local residents, and appropriate construction work planning will be needed to prevent significant disruptions to social and economic activities in the vicinity of the plan area due to traffic congestion during the construction period.
	(3) Cultural assets	① Will the project damage any valuable archaeological, historical, cultural, or religious assets or historic sites? Are any measures specified by the country's domestic laws being considered?	① There are no reports of cultural assets under related laws of Indonesia in the vicinity of the plan area.
	(4) Scenic landscapes	① Will there by any negative effects on particularly noteworthy scenic landscapes? Will any necessary measures be taken?	① There are no reports of scenic areas under related laws of Indonesia in the vicinity of the plan area.

	(5) Minorities and aboriginal peoples	① Does the project comply with the country's laws concerning the rights of minorities and aboriginal peoples? ② Are steps taken to reduce the impact on the cultures and lifestyles of minorities and aboriginal peoples?	① There are no reports of communities of minorities or aboriginal peoples in the vicinity of the plan area. ② Not applicable.
	(6) Working environment (including occupational safety)	① Is the project implementer in compliance with the country's laws concerning the working environment? ② Is the "hardware" of safety considerations in place for persons related to the project, such as safety equipment for the prevention of occupational accidents and management of hazardous substances? ③ Is safety "software" planned and implemented for persons related to the project, including developing a health and safety plan and providing safety education for workers, etc., (including traffic safety and public health)? ④ Are the security personnel related to the project capable of taking appropriate measures to ensure the safety of persons related to the project and local residents?	① The construction plan is to be developed in compliance with the country's laws concerning the working environment. ② Basic policies on labor management safety and prevention of occupational accidents will be proposed in the construction plan which is to be developed in the future. ③ Same as above. ④ Same as above.
5. Other	(1) Impact of construction work	① Have measures been prepared to reduce pollution during construction (noise, vibrations, slurry, dust, exhaust gases, wastes, etc.)? ② Will construction have any adverse impact on the natural environment (ecosystems)? Have measures been prepared to reduce impacts? ③ Will construction have any adverse impact on the social environment? Have measures been prepared to reduce impacts?	① A comprehensive environmental management program proposal including a monitoring framework and mitigation measures will be developed for pollution during construction (noise, vibrations, slurry, dust, exhaust gases, wastes, etc.) and effects on the social environment ② As stated above, there are no particularly noteworthy nature preserves or ecosystems in the vicinity of the plan area, so mitigation measures will not be planned in this survey. ③ Effects on the surrounding social environment of the survey prior to and during construction and after project completion will be analyzed in the EIA investigation which is planned for future implementation, and mitigation measures will be proposed as needed, based on its results.
	(2) Monitoring	① Will operator monitoring be planned and implemented for those environmental items above that are expected to have an impact? ② Are the plan items and their methods and frequencies, etc., judged to be appropriate? ③ Will an operator monitoring system (organization, personnel, equipment, budget, etc., with continuity) be established? ④ Are there regulations concerning the methods, frequencies, etc., of reports from the operator to governing agencies, etc.?	① A monitoring system will be proposed that allows close communication between the operator, which will play the primary role, and the Ministry of Environment, Regional Environmental Agency of DKI Jakarta, and so on. ② The plan for observation of environmental parameters to be included in the monitoring plan (such as roadside air quality, noise and vibrations, ground water level, and surface water quality) will separately determine the locations and frequencies of observation, based on the final execution plan proposal. ③ Based on [1]. ④ No such regulations.

6. Important points	Use of other environmental checklists	① If necessary, items from checklists related to roads, railways, and bridges should be added and evaluated (in cases where infrastructure facilities involve the establishment of access roads, etc.). ② If necessary, items from checklists related to power transmission, transformation, and distribution or pipelines should be added and evaluated with regard to construction of telephone lines, pylons, undersea cables, etc.	① Not applicable. ② Not applicable.
	Matters of note concerning use of environmental checklists	① Effects on environmental problems of an international or global scale should also be evaluated, if necessary (in cases such as cross-border waste disposal, acid rain, destruction of the ozone layer, or other factors related to global climate change).	① None.

Source: Study Team, 2012

6.3.2 Ecological scoping proposal

Tables-6.3.3 – 6.3.5 show the respective results of initial ecological scoping at the project planning stage, the construction stage, and the stage after completion.

Table-6.3.3 Initial ecological scoping: Social environment

	Ecological item	Evaluation of impact level			Reasons for evaluation
		Before construction	During construction	After completion	
Social environment					
1	Involuntary relocation of residents	A	D	D	Many homes, stores, places of business, etc., are located in Blocks A, B, C, and D, where redevelopment is planned (estimated at about 200 buildings, but the precise number is currently unknown). Land acquisition negotiations will need to be completed before implementation of the redevelopment project.
2	Employment, livelihoods, and other local economic factors	A	A	D	Many stores, places of business, etc., are located in Blocks A, B, C, and D, where redevelopment is planned. (The precise number is unknown). It is anticipated that there will be some level of disturbance to their commercial activities before implementation of the redevelopment project and during the construction period.
3	Use of land and regional resources	D	D	D	There will be practically no impact on regional land use or regional resources during the entire project cycle.
4	Social capital, local decision making organizations, and other social organizations	D	D	D	There will be practically no impact on regional social capital, local decision making organizations, or other social organizations during the entire project cycle. However, one mosque has been confirmed, and it is an important support for people in the area. Continued investigation is needed concerning handling of this mosque.
5	Existing infrastructure and social services	B	A	D	Temporary worsening of traffic congestion is anticipated in area roads during the removal of places of business and homes in Blocks A, B, C, and D, where redevelopment is planned. Temporary worsening of traffic congestion is also anticipated during the construction period because traffic on Blora Street, where construction is planned, will be cut off during underground walkway construction.

6	Poor residents, aboriginal peoples, and minorities	B	D	D	There are illegal squatter settlements along the existing railway in Block B, where redevelopment is planned. Negotiations concerning their removal will need to be completed before implementation of the redevelopment project.
7	Uneven distribution of income and benefits	D	D	D	The project is not expected to have any significant effect in causing uneven distribution of income and benefits.
8	Historic sites and cultural assets	D	D	D	There are no historic sites or cultural assets for protection in the vicinity of the plan area.
9	Conflicts of interest in the region	D	D	D	The project is not expected to have any significant effect in causing conflicts of interest in the region.
10	Water use, water rights, and rights of common	D	B	D	The use of shallow wells in some areas near the plan area has been confirmed. Ground water is also used by large-scale office buildings. There is concern regarding temporary depletion or deterioration of water quality during the construction period due to underground work.
11	Public health	B	B	D	Changes and deformations of the area's ground surface are anticipated during the construction period and after completion due to the artificial ground, urban redevelopment, etc., and there is a heightened risk of dengue fever, etc., due to temporary pooling of water as a result.
12	Disasters, risks, and infections diseases including HIV/AIDS	B	B	D	During the demolition of homes and facilities prior to implementation of redevelopment, there is a heightened risk of dust, unsanitary water, foul odors, etc. During the construction period, there is a heightened risk of unforeseen accidents such as ground collapse or cave-in during underground work.

Source: Study Team, 2012

Key: A: Serious impact. B: Some degree of impact. C: Degree of impact is unknown. D: No significant impact.

Table-6.3.4 Initial ecological scoping: Natural environment

	Ecological item	Evaluation of impact level			Reasons for evaluation
		Before construction	During construction	After completion	
Natural environment					
13	Topography and geology	D	D	D	There are no plans for earthwork that would cause large-scale changes in the surrounding topography (although there will be some open-cut work). Therefore, impacts on area topography and geology will not be serious.
14	Ground water	D	A	B	The ground water level is high in the vicinity of the plan area, and there is a heightened of risk of ground water leakage from open-cut surfaces during the construction period. Also, if chemical grouting is performed during construction to prevent ground water leakage, there is a heightened risk of water quality deterioration in the surrounding ground water. After completion, there is a heightened risk of local obstruction of ground water flows and changed flows due to the underground walkway.
15	Erosion	D	D	D	There are no plans for earthwork that would cause large-scale changes in the surrounding topography (although there will be some open-cut work), and there are no steep slopes or similar land forms.
16	Hydrology	D	B	B	Changes in the area's ground surface are anticipated during the construction period and after completion due to the artificial ground, urban redevelopment, etc., and there is a heightened risk of changes in local hydrological characteristics (water balance) as a result.
17	Coastal ecosystem	D	D	D	None.
18	Plant and animal life	D	D	D	None.

19	Meteorology	D	B	B	Changes in the area's ground surface are anticipated during the construction period and after completion due to the artificial ground, urban redevelopment, etc., and there is a heightened risk of local meteorological changes due to resulting changes in local hydrological characteristics (water balance).
20	Landscape	D	B	C	Because the artificial ground will be built in the space over a flood control waterway, there will be changes in visual range and landscape recognition from pedestrian and vehicular lanes. The urban redevelopment will also cause changes in the area's landscape during the construction period. It is highly likely that trees will need to be cut in the green spaces in five locations within the target zone (7,000 m^2 + 6,000 m^2 = 13,000 m^2: however, the 7,000 m2 is outside the scope of this project, as it is due to the construction of the new MRT station).
21	Global warming	D	B	C	Temporary changes in carbon dioxide emissions are anticipated during the construction period due to activities including the use of concrete and other construction materials, operation of construction vehicles, disposal of waste building materials, and dismantlement and disposal of homes and places of business for redevelopment.

Source: Study Team, 2012

Key: A: Serious impact. B: Some degree of impact. C: Degree of impact is unknown. D: No significant impact.

Table-6.3.5 Initial ecological scoping: Public hazards

	Ecological item	Evaluation of impact level			Reasons for evaluation
		Before construction	During construction	After completion	
Public hazards					
22	Air pollution	B	B	C	Even at present, there are recognized effects on roadside air quality due to exhaust gases from area traffic. Temporary deterioration in roadside air quality is anticipated due to increases in local traffic volume from construction vehicles during the construction period.
23	Water contamination	D	B	C	There is a heightened risk of leakage of chemicals and slurry, etc., into waterways due to ground improvement and foundation construction near the banks of a waterway. In temporary pier construction, approximately 40 pilings are planned within the flood control waterway, and dredging work is planned in conjunction with this. Heavy metal contamination including arsenic is reported in some of the sediment and mud of the waterway, and there is a heightened risk of arsenic diffusion in the waterway due to dredging.
24	Soil contamination	D	B	C	Chemical grouting is planned during construction of the underground walkway for ground reinforcement and prevention of ground water leaks, and there is a heightened risk of contamination of surrounding soil due to such chemicals.
25	Waste	D	A	B	It will be necessary to dispose of building waste materials due to demolition of existing homes and places of business for urban redevelopment. It will also be necessary to dispose of surplus soil from construction of the underground walkway.
26	Noise and vibrations	B	A	C	Even at present, there are recognized effects on roadside noise and vibrations due to area traffic. Temporary worsening of roadside noise and vibrations is anticipated due to increases in local traffic volume from construction vehicles during the construction period.
27	Ground subsidence	B	A	C	Even at present, ground subsidence is advancing in the vicinity of the plan area, and there is a heightened risk of local ground subsidence during the construction period due to abnormal ground water flows from the open-cut surfaces.

28	Foul odors	D	B	C	There is a heightened risk of foul odors (putrid odors, etc.) caused by pooling due to local drainage problems during construction.
29	Bottom sediment	D	A	C	There is a heightened risk of abnormal deposits on the bottom of the flood control waterway due to slurry flows into the waterway during piling construction near its banks. In temporary pier construction, approximately 40 pilings are planned within the flood control waterway, and dredging work is planned in conjunction with this. Heavy metal contamination including arsenic is reported in some of the sediment and mud of the waterway, and there is a heightened risk of arsenic diffusion in the waterway due to dredging.
30	Disaster risks	B	B	A	Increased traffic volume and worsened congestion are anticipated due to temporarily cutting around nearby roads during construction and operating construction vehicles, and there is a heightened risk of traffic accidents. In past floods (including the 2007 flood), the vicinity of the plan area has been temporarily inundated. Therefore, there is a heightened risk of flood water flowing into the underground walkway. The city of Jakarta, including the plan area, has a high risk of earthquakes.

Source: Study Team, 2012

Key: A: Serious impact. B: Some degree of impact. C: Degree of impact is unknown. D: No significant impact.

6.3.3 Basic response policies for environmental and social considerations

A summary of the results of initial ecological scoping (items evaluated as levels A or B in Tables-6.3.3 – 6.3.5 above) is presented in Table-6.3.6.

Table-6.3.6 Results of initial ecological scoping and response policies

	Ecological item	Comments
1	Involuntary relocation of residents	Many homes, stores, places of business, etc., are located in the blocks where redevelopment is planned (estimated at about 200 buildings, but the precise number is currently unknown), and commercial activities are thriving. Land acquisition negotiations will need to be completed before implementation of the redevelopment project. In preparation for the redevelopment project, it is necessary to accurately determine the number of houses, household makeup, number of businesses, and business content, etc., in the redevelopment area, disclose information and explain the project at an early stage, conduct investigation and analysis (RAP investigation) concerning the socioeconomic structure of the redevelopment area, and obtain agreement concerning land acquisition.
2	Employment, livelihoods, and other local economic factors	
5	Existing infrastructure and social services	Temporary worsening of traffic congestion is anticipated in area roads for reasons including cutting off traffic on Blora Street, where construction is planned, during underground walkway construction. It is necessary to develop an execution plan that avoids obstructing the area's social and economic activities.
6	Poor residents, aboriginal peoples, and minorities	There is an illegal squatter community along the existing railway in Block B, where redevelopment is planned. We have received information that the area of this illegal squatter community is scheduled for eviction due to the construction of a temporary road for the METRO construction project. Accordingly, first the details of the project will be confirmed with the METRO project entity. Then, if necessary, the precise number of households and household makeup in this area should be determined. In addition, information should be disclosed and the project should be explained at an early stage, and complete negotiations concerning removal should be completed (to be performed as part of the RAP investigation mentioned above)

10	Water use, water rights, and rights of common	The use of shallow wells in some areas near the plan area has been confirmed. Ground water is also used by large-scale office buildings. There is concern regarding temporary depletion or deterioration of water quality during the construction period due to underground work, and therefore, it is necessary to accurately determine the situation of ground water use in the plan area (such as the number of wells, types of wells including shallow and deep wells, and pumping capacity), conduct measurements concerning the area's ground water level and water quality of ground water, determine ground water flows in the plan area, and collect baseline data.
11	Public health	A system will be established for the early discovery of temporary pooling of water during the construction period and after completion, and an environmental management plan will be developed, including use of insecticides.
12	Disasters, risks, and infections diseases including HIV/AIDS	The contractor will be requested to take preventive measures to reduce the risks of dust, unsanitary water, foul odors, etc., and it will be confirmed that a plan proposal has been developed that does not encourage unreasonable actions such as illegal disposal of construction materials in relation to relocation and land acquisition. An execution plan and safety management system (including an environmental management plan) will be developed to avoid and reduce the risks of unforeseen construction accidents such as ground collapse or cave-in.
14	Ground water	The ground water level is high in the vicinity of the plan area, and chemical grouting is planned for ground improvement. It has been reported that ground water use is possible in a portion of the nearby area (mentioned in item 10, "Water use, water rights, and rights of common"). Because there is concern about unforeseen depletion or deterioration of water quality during the construction period due to underground work, it is necessary to accurately determine the situation of ground water use in the plan area (such as the number of wells, types of wells including shallow and deep wells, and pumping capacity), conduct measurements concerning the area's ground water level, aquifer structure (presence of pressured and unpressured strata, permeability coefficient, etc.), and water quality of ground water, determine ground water flows in the plan area, and collect baseline data. In addition, there is concern about local obstruction of ground water flows due to the underground walkway and other structures after completion, so the effects will be predicted using numerical models or physical models, etc.
16	Hydrology	Changes in the area's ground surface due to the artificial ground, urban redevelopment, etc., and resulting changes in area runoff (changes in local hydrological characteristics) are anticipated, and depending on the content of such changes, it is possible that microclimate changes may occur as a result. Also, the plan area has been submerged and inundated by past urban floods, and as indicated in item 30 ("Disaster risks") below, it is highly necessary to compile data for use in studying local landside drainage. Therefore, the characteristics of the current wide-area water balance situation, including the redevelopment area and the area of the planned artificial ground, will be analyzed; the problem of landside drainage during the construction period and after completion will be studied, assuming the recurrence of urban floods of the same scale as past floods; and feedback will be provided for environmentally friendly building design including "green building" design (with water retention facilities and a green landscape conservation area on the roof).
19	Meteorology	

20	Landscape	The project will cause large-scale changes in the urban landscape of central Jakarta, and is expected to increase the uniqueness of various landmarks as scenic elements. The potential of this project to establish landmarks and build the area's identity will be communicated with and discussed by local residents and other stakeholders, using computer graphics and other means of visualization to present the project's visual aspects. It is highly likely that trees will need to be cut down as part of the construction work. Accordingly, a study of the tree inventory within the designated green zones and other relevant vegetation studies will be conducted in advance. After that, the number of trees to be cut down will be determined and proposals for a substitute green zone and so on will be formulated, after which an application for a tree cutting permit will be submitted. It is also very likely that the trees planted on the west bank of the Banjir Kanal will need to be cut down as a result of the expressway construction project (for which studies are in progress as of September 2012). Accordingly, first the details of the project need to be confirmed with the entity promoting the expressway construction project, and in addition the necessary documents for the tree cutting permit for this project need to be prepared.
22	Air pollution	Because increased traffic volume is anticipated during the construction period due to construction vehicles, along with a temporary deterioration in roadside air quality, baseline data will be collected in the plan area before project implementation (along main trunk roads and roads for transportation of construction materials) by measuring the current roadside air quality and conducting microclimate measurements. The items for measurement could include dust (PM10), nitrogen oxides (NO_x), carbon monoxide (CO), wind direction, and wind speed. Continuous 24-hour measurements will be conducted in multiple locations (for example, five locations) at representative times of the rainy season and the dry season. Measurement will be continued during the construction period and after completion.
23	Water contamination	Ground improvement and foundation construction are planned near the banks of a flood control waterway for artificial ground construction, and there is a heightened risk of leakage of chemicals and slurry, etc., into the waterway. Also, in temporary pier construction for the artificial ground, approximately 40 pilings are planned, and waterway dredging work is planned in conjunction with this. Heavy metal contamination including arsenic is reported in some of the sediment and mud of the waterway, and there is a heightened risk of arsenic diffusion in the waterway due to dredging. Therefore, baseline data will be collected before project implementation by measuring current water quality at two cross sections, upstream and downstream of the planned artificial ground site (two sampling points per cross section). The measurement parameters should include heavy metals such as arsenic, in addition to the usual parameters such as BOD, COD, DO, SS, and pH. (Note: A list of Japan's standards concerning arsenic is included as an appendix.) Measurements will be conducted on representative flows for the rainy season and the dry season. Such measurement will be continued during the construction period and after completion.
24	Soil contamination	Chemical grouting is planned for ground reinforcement during construction of the underground walkway and artificial ground, and there is a heightened risk of contamination of surrounding soil due to such chemicals. Therefore, baseline data will be collected before project implementation by soil sampling at multiple points.
25	Waste	This project is expected to generate building waste from demolition of existing homes and places of business in urban redevelopment, and surplus soil from underground walkway construction. Therefore, based on the quantities and times for each type of waste generation, the disposal sites that can be accessed from the vicinity of the plan site will be identified, and appropriate disposal methods for the building waste will be determined.

26	Noise and vibrations	Because temporary worsening of roadside noise and vibrations is anticipated due to increases in local traffic volume from construction vehicles during the construction period, baseline data will be collected before project implementation by measuring the current levels of roadside noise and vibrations in the plan area (along main trunk roads and roads for transportation of construction materials). The items for measurement could include Leq (noise) and L10 (vibrations). Continuous 24-hour measurements will be conducted in multiple locations (for example, five locations) at representative times of the rainy season and the dry season. These measurement locations should be the same as the locations for air quality measurements. Measurement will be continued during the construction period and after completion.
27	Ground subsidence	Concerning the situation of area ground subsidence caused by abnormal ground water leaks due to underground walkway construction, predictions will be made for each of the representative stages of implementation, based on the current situation of ground water flows and geological structures (using numerical models or physical models, etc.); study will be performed concerning the situation of ground water leaks, resultant accelerating consolidation, and the degree of area ground subsidence; and the necessary measures will be devised (partially overlapping with item 14, "Ground water," of the content for investigation). Also, the results of predictions concerning topographical deformation during construction and after completion will be reflected in urban flooding countermeasures under item 30, "Disaster risk," to improve the reliability of such study results.
28	Foul odors	There is a heightened risk of foul odors (putrid odors, etc.) caused by pooling due to local drainage problems during construction. As mentioned in item 11, "Public health," the necessary environmental management planning will be performed, including establishment of a system for the early discovery of temporary pooling of water.
29	Bottom sediment	During the construction period, pilings (about 40) are planned for pier construction in two locations within the flood control waterway. Heavy metal contamination including arsenic is reported in some of the sediment of the waterway, and for the implementation of dredging and related work, it is necessary to perform soil investigation based on, for example, Japan's Soil Contamination Countermeasures Law, and to confirm the soil distribution of pollutants in the plan area, estimate the volume of polluted soil, study remediation measures for each pollutant substance, and develop measures to prevent dispersion in the waterway during construction and after completion. It is also necessary to devise appropriate disposal methods for slurry, which is expected to be generated in foundation work for the artificial ground near the banks of the waterway.
30	Disaster risks	With regard to increased traffic volume and congestion and increased risk of traffic accidents in the area due to operation of construction vehicles during the construction period, an execution plan will be developed to provide ample capacity, while determining detour routes and times in view of the overall process. The vicinity of the plan area has a high risk of urban flooding, ground subsidence, and earthquakes, and design studies will fully reflect such factors. Concerning urban flooding countermeasures, in combination with item 16, "Hydrology," and item 19, "Meteorology," the problem of landside drainage during the construction period and after completion will be studied, assuming the recurrence of urban floods of the same scale as past floods; the necessary measures will be devised, and feedback will be provided for facility design.

Source: Study Team, 2012

6.4 Approach to environmental and social considerations

6.4.1 Environmental permits and feedback from environmental aspects

Firstly, in order to ensure the smooth execution of the Dukuh Atas Station area development project, environmental permits must be acquired. It is essential to conduct an appropriate environmental impact assessment in accordance with procedures that conform to Indonesian EIA legislation (see 6.2.3). In making this assessment, the necessary studies should be conducted based on the preliminary

environmental assessment (see Table 6.3.2) and results of scoping (Table 6.3.3-6.3.6) that were conducted in this study, in order to conduct a qualitative assessment of the impact forecasts relating to the various types of environmental impact that will result from the execution of the project. If, based on the results, it is determined that the degree of impact will be serious, it is also essential to formulate appropriate mitigation and environmental management plans.

In Indonesia, it is a requirement that the preparation of environmental impact assessments and other relevant documents and reports needed for applications for environmental permits be conducted by a consulting firm that has been registered with the Indonesian Ministry of Environment. Accordingly, it is essential to select an appropriate firm to ensure that environmental permitting proceed smoothly. The next section (6.5) covers the establishment of a ToR for the acquisition of these environmental permits and the approach to environmental management planning.

In addition, in the planning for this project, it will be crucial to not only reduce or avoid negatives with respect to the environment but to add plusses as well, such as determining how to create spatial environments that are desirable for human activities (including such aspects of the comfort and amenities provided by spatial environments). The sustainable development approach proposed by the World Commission on Environment and Development is not an either/or one of simply economic activity or environmental preservation and creation, but rather one in which both of these concepts can coexist with one another and, furthermore, in which methods to resolve local or global environmental problems that are based on this approach are the most effective. The guidebook for sustainable community-building (Ministry of the Environment, 2002) lists eight main themes:

1. Climate change prevention & energy
2. Transport & air quality
3. Material circulation
4. Water quality & water circulation
5. Experience with pollution issues
6. Aesthetic appeal
7. Biodiversity & nature
8. History & culture

Which of these themes to select is a matter that should be determined by each of the stakeholders — local residents, companies, local governments and so on — based on the actual circumstances in the region. Here, the key points regarding harmony with the artificial ground to be created as a result of this project will be organized from the perspective of the impact on energy circulation and regional climate (occurrence of "heat island" phenomenon, etc.).

6.4.2 Harmony with artificial environments

In this redevelopment project, large-scale artificial environments including an underground walkway, artificial ground, and redeveloped urban space will be reconstructed in central Jakarta. One issue to be addressed in terms of economic and social considerations for general urban spaces and other highly artificial situations is that the circulation of matter and energy in the natural state is seriously impeded. Another aspect is the difficulty of survival for plant and animal life.

The issues related to circulation of matter and energy in urban spaces include the emergence of the heat island effect, which is caused by artificial structures covering the earth (even Jakarta, a hot environment, has seen a rising trend in recent years; see Table 6.1), and local soil desiccation, abnormal runoff, and other problems with water circulation caused by the failure of rainwater to

permeate the ground. Other related issues include reduction in natural habitats for wild animals due to manmade environments, decreases in local biodiversity, and loss of opportunities and places for contact between human beings and nature.

To improve this situation, a number of nature restoration projects have been started in Japan, based on the standpoint that it is possible to rebuild and reintegrate a natural landscape, even in environments that are highly artificial. The application of this concept in the redevelopment project for the area of Dukuh Atas Station is the first such endeavor in Indonesia, and it can provide a model case for future urban redevelopment in Jakarta in order to present an exemplar of good practices for future urban redevelopment planning in Indonesia.

Clearly, the kind of nature that is created and restored under such circumstances is different from the wild nature that existed prior to the interposition of human activities. For example, the kinds of natural plant ecosystems that are created using lightweight engineered soils on green roofs are spaces created under artificial environmental conditions that are far removed from natural ecosystems. If the coexistence of both kinds of nature is promoted, without eliminating this kind of artificial nature but while also making efforts to increase factors that are more natural, this could become an important characteristic of this PPP project. A law on green buildings was enacted in Indonesia by order of the Ministry of Environment in 2010 (see section 6.2.4), and it is anticipated that this kind of movement could become an important factor in the future redevelopment and reintegration of enormous manmade spaces such as Jakarta.

In promoting the naturalization of the urban environment, it is also necessary to pursue the kinds of nature restoration and creation that can make an important contribution to the reconstruction of ecological networks on a larger scale. In highly artificial areas such as cities, opportunities for obtaining spaces for nature restoration and creation tend to be limited. However, it is extremely important to bring natural spaces into manmade spaces (treating nature restoration and creation as an integral part of the development of urban spaces) while giving as full consideration as possible to aspects such as natural fluctuations, appropriate management, and the creation of spaces where people can come into contact with nature. This is an urgent issue to be addressed by DKI Jakarta.

One more point to keep in mind when applying this concept to Indonesia in the restoration, creation, maintenance, and management of these kinds of urban natural environments is the importance of using appropriate technologies, capacity building of human resources, and designing comprehensive systems that make use of traditional skills and technologies.

6.4.3 Local climatic environments accompanying urbanization

In general, the formation or redevelopment of urban areas necessarily involves the concentration of energy. Up to now, urban infrastructure construction has resulted in a reduction in greenery and water surfaces, and the increase in the number of buildings, roads and other artificial structures has led to a rise in the surface temperature of these structures during the day, with the result that they absorb the heat until nightfall, leading to a rise in the temperature of the air within the city. Moreover, the use of air conditioners in order to create comfortable spaces within the city causes large quantities of artificial waste heat to be discharged into the city, resulting in a vicious cycle in which the temperature of the air within the city is raised further. The rise in air temperature within the city brought about by the creation of artificial ground surfaces produces discomfort that is greater than people simply feeling that it is hot. Previous studies have found that people do not feel that it is hot only because of the temperature: humidity, air flow heat radiated from buildings and roads in the surrounding environment

and so on are also key factors. As noted earlier, the mean air temperature within the city of Jakarta has also been increasing for the past few years, and this "heat island" phenomenon is becoming a serious problem facing urban environments (see Table-6.1).

One measure for improving the thermal environment in the city and creating or forming new urban value is to create large-scale green zones within the city. In general, large-scale green zones in the city are known to have a lower temperature than the surrounding city blocks, and this is expected to become an effective measure for improving the thermal environment in surrounding urban areas. However, even if there is cool air in the green zones, the reality is that there are high-rise buildings in the area around the green zone and roads in the surrounding and adjacent areas that heat up. As a result, the extent to which the beneficial effects of green zones on the urban thermal environment can be received is limited. Solutions to this problem are expected to include designing buildings so they do not become warm and taking wind direction into consideration in order to secure breeze corridors that expand the area that the cool air can reach, which will improve both thermal radiation and the breezes that people can sense. Increasing and effectively harnessing the heating and cooling potential of greenery, wind, water and other elements of nature to improve the thermal environment of surrounding urban areas will make these natural resources play an important role as infrastructure that improves the urban living environment. Table-6.3.7 shows a list of several urban climatic elements and the changes that occurred in an American city (population approximately 1 million) when a conventional urban infrastructure was constructed.

Table-6.3.7 Average change in climatic elements as a result of urbanization

Climatic Environmental Factor	Comparison with Suburbs
Atmospheric pollution	
Dust	10 times
Exhaust fumes	5-25 times
Clouds	
Cloudiness	5-10% increase
Fog (winter)	100% increase
Fog (summer)	30% increase
Rainfall	
Rainfall amount (total)	5-10% increase
No. of days with 5 mm or less daily rainfall	10% increase
Snowfall	5% decrease
Humidity	
Winter	2% decrease
Summer	3% decrease
Sunlight	
Whole sky	15-20% decrease
Ultraviolet rays (winter)	30% decrease
Ultraviolet rays (summer)	5% decrease
Hours of daylight	5-15% decrease
Temperature	
Annual average	0.5-1.0 ℃ rise
Average minimum temperature (winter)	1.0-2.0 ℃ rise
Heating degree days	10% decrease
Wind speed	
Annual average	20-30% decrease
Instantaneous maximum wind speed	10-20% decrease
No. of tranquil days	5-20% increase

(Source: Tsuchiya, 1975)

6.4.4 Role of urban greening

In this way, green zones have been judged to be effective in improving urban climates. However, a precondition for using these effectively is that the transpiration action of the green zone must be at maximum level. This requires that plants be able to obtain sufficient water from their roots and requires that, for example, a source of groundwater be secured.

In addition, one of the crucial roles that green zones play in urban areas is climate mitigation. The interchange between the air near the ground surface and the sunlight energy at the ground surface acts to minimize the range of extreme local and temporal fluctuations that tend to occur in urban climates. In urban green zones, the low reflectivity of the green zone results in a greater absorption of solar energy than in areas paved with concrete, and the evapotranspiration of trees reduces the temperature in the areas around green zones. (The thermal conductivity of concrete is lower than that of wet soil, and a dramatic rise in temperature tends to occur in the surface in response to even a tiny bit of solar energy.)

Although this region is centrally located, it is dotted with green zones both small and large in scale. However, at present these green zones are cut off by buildings, roads and railways, and it is possible that the effect of these green zones as cooling and heating resources is not being adequately utilized in the area as a whole. Organically connecting the existing small-scale green zones through the use of green policies in artificial ground areas, etc., will enable the cooling and heating to be used by the region as a whole.

Such measures are thought to be desirable from the standpoint of preserving scenic beauty and ecosystems as well. In addition, the current plan to restore the Banjir Kanal as a flood control waterway will increase the water surface area, and this is also expected to be effective in improving the local thermal environment. In this effort, it will be important to create areas along the canal where people can come in contact with water as places for rest and relaxation on the part of city residents. The goal is to conduct urban planning that takes full advantage of waterfront areas and creates an attractive living environment where people can feel close to nature.

6.5 ToR Development for relevant environmental study

6.5.1 Introduction

Successful environmental approval for the proposed town redevelopment project of Dukuh Atas Area is very important for its smooth project implementation. The application of this environmental approval shall be based on both Indonesian environmental laws and/or regulations (see Section 6.2 for more detailed descriptions) and JICA Guideline of Social and Environmental Considerations (revised in 2010, hereinafter referred to as JICA Guideline). Followings are major critical documents and/or issues to be addressed for this environmental approval application.

1. Environmental Impact Assessment（EIA, see Section 6.2.3）
2. Resettlement Action Plan (LARAP, see Section 6.2.8)
3. Application of Trees Cutting (see Section 6.2.5)

Among of them, the preparation of EIA documents is one of the most important processes, and ToR of appropriate EIA study shall be developed and be approved by the relevant environmental agency prior to its study implementation. It is noted that DKI regional environmental agency (BPLHD) is the

competent environmental agency within this proposed project. So, it is crucial to have a series of discussion with this agency to figure out the most suitable EIA study process for the ToR approval.
In this section, the draft ToR for suitable environmental and social studies for EIA is summarized. These EIA-related studies would be part of the feasibility study, to be conducted at the next project cycle of this proposed Dukuh Atas Area Redevelopment Project. Basically, any areas which would receive potential negative impacts to be caused during both construction and operation phases of this proposed project are regarded as the area of concern (AOC) for this environmental and social studies. This AOC is categorized as either of "directly influenced" or "indirectly-influenced" area, depending on the order of the magnitude of potential negative impacts (see Section 6.5.2 for more detailed descriptions).
Regarding the land acquisition to be caused by the implementation of large-scale infrastructure development projects in Indonesia, project owners shall conduct Land Acquisition and Resettlement Plan (LARAP) study, depending on the scale of relevant potential social impacts. There are following two types of LARAP-related plans,

(i) Full-scale LARAP: More than equal 200 PAPs (or 40 households)
(ii) Simplified LARAP: Less than 200 PAPs (or 40 households)

Note: PAPs = people affected by the projects

It is highly likely that more than 200 houses will be affected by the implementing of this proposed Dukuh Atas Redevelopment project, one of key project components within this study (see Table-6.3.2), so that a full-scale LARAP-related study is required for successful project implementation. This LARAP study is highly-related with contents of EIA. So, LARAP-related ToR development is included within this entire ToR development work for the simplification.

6.5.2 Area of Concern for EIA Study

Mainly, the proposed project consists of following three components, i.e., (i) underground walkway, (ii) artificial ground, and (iii) redevelopment of Dukuh Atas Area. Area of concerns (AOC) for relevant EIA study shall be delineated based on both engineering and environmental features of the proposed project. This AOC shall include both "directly influenced" and "indirectly influenced" areas, reflecting both spatial and temporal scales of potential negative impacts to be caused by the project implementation. After delineating the AOC, then, appropriate ToR for EIA study shall be developed. It is noted that this ToR shall be approved throughout a series of discussions with both BPLHD and key stakeholders such as communities of Dukuh Atas Area prior to both implementation of EIA and LARAP studies.
There is no specific direction for AOC setting in Indonesia, yet. Within EIA studies for BRT extension projects of Jakarta, currently applying another new environmental license, boundaries of both "directly influenced" and "indirectly influenced" areas are set at the perimeter, located at 100 meters and 200 meters away both sides from the project centerline, respectively. As a result, two similar types of narrow strip bands, the total band width with 200 meters and 400 meters, are defined as the "directly influenced" and "indirectly influenced" areas, respectively, and then, relevant environmental and social studies were conducted for these BRT extension projects (BPLHD, personal communication, 2012).

Figure 6.5.1 shows the draft AOC for the EIA study for Dukuh Atas Redevelopment project, based on these rules. It is noted that boundaries of AOC is located 200 meters away from outermost perimeters of all combined project components (i.e., (i) underground walkway, (ii) artificial ground, and (iii) redevelopment of Dukuh Atas Area).

Figure-6.5.1 AOC of Relevant EIA Study (estimated)

Note: Solid lines drawn in this figure indicate the boundary of AOC, to be required for EIA Study of the proposed Dukuh Atas Area Redevelopment Project (estimated). Basically, those boundaries are located 200 meters away from the nearest project site such as Blocks A, B, C and D.

6.5.3 ToR (Draft)

Based on preliminary environmental scoping results, summarized in Table 6.3.6, ToR for the EIA study, to be conducted within the following feasibility study, is developed. Basically, this ToR development is carried out abiding by EIA Law and/or relevant environmental regulations of Indonesia and JICA Guideline.

Table 6.5.1 summarizes major tasks of EIA study to be required for the proposed Dukuh Atas Redevelopment Project. Tables 6.5.2 ～ 6.5.4 summarize the baseline environmental social information collection, relevant field studies such as the roadside air quality survey, and socio-cultural studies, respectively. Tentative schedules of both EIA and LARAP studies are summarized in Table 6.5.5. It is noted that both EIA and LARAP studies are to be carried out, separately. It is assumed that relevant procurement process for both EIA and LARAP studies covering from the tender process

to mobilizations would take two (2) months, and another ten (10) months would be required for implementation of both studies. Relevant studies for the application of tree cutting permits are to be conducted as part of EIA study (see Task Items 2 and 5, listed in Table 6.5.1 and Task Item 9, listed in Table 6.5.3).

As of September 2012, any specific plans of Dukuh Atas Redevelopment Project, including its implementation framework, are not finalized, yet. Draft ToR of both EIA and LARAP studies, mentioned above, is developed, based on the engineering study results, tentatively summarized in September, 2012. So, it is important that the proposed draft ToR for both EIA and LARAP studies shall be updated and/or revised once any modifications and/or new developments in engineering design work of the proposed project would occur after September 2012.

Table-6.5.1 Major Tasks for EIA-related Study

	Items to be collected
1	**Descriptions of Baseline Environment Condition**
	Describe environmental baseline condition of selected pre-feasibility projects. 1) Bio-Physical condition 2) Socio-Cultural condition More detailed descriptions are summarized in Table-6.5.2.
2	**Environmental Field Survey**
	Carry out following environmental field surveys, 1) Roadside Air Quality Survey 2) Roadside Noise Survey 3) Roadside Vibration Survey 4) Soil Survey 5) Sediment Survey 6) Water Quality Survey 7) Groundwater Quality Survey 8) Hydrological Survey 9) Tree Inventory Survey More detailed descriptions are summarized in Table 6.5.3.
3	**Social Survey**
	Carry out following social surveys, 1) Socio-Cultural Survey 2) LARAP-related survey 3) LARAP-related survey (illegal squatters) More detailed descriptions are summarized in Table 6.5.4,
4	**Environmental Impact Assessment**

	Evaluate potential environmental impacts of three project stages such as 1) pre-construction phase, 2) construction phase, and 3) operational phase shall be described. Besides, following impact assessment studies shall be conducted in order to stress out the advantage/disadvantage of the proposed project quantitatively. 1) Vehicular Emission Study (CO_2) 2) Air Quality Prediction Study 3) Noise Prediction Study 4) Vibration Prediction Study 5) Run-off (road surface drainage) Study 6) Urban Vegetation Impact Study 7) Banjir Kanal Flood Prediction Study 8) Regional Groundwater Flow (or Level) Prediction Study 9) Regional Land Subsidence Prediction Study 10) Visual Impact Study 11) Socio-Economic Impact Study
5	Environmental Mitigation
	Describe comprehensive, effective measures of the mitigation (i.e., avoidance, reduction, and elimination) of negative impacts for the pre-construction, construction and operation phases of the project. In particular, the re-vegetation plan, based on study results of both the tree inventory survey (Item 9 of Table 6.5.3) and the urban vegetation impact study shall be developed.
6	**Environmental Management**
	Establish appropriate environmental management plan. Specific objectives of this plan are to 1) define organizational and administrative arrangements for the environmental monitoring, including the definition of responsibilities of staff, coordination, liaison and reporting procedures, and 2) to discuss procedures for pro-active environmental management, so that potential problems can be identified and mitigation measures to be adopted prior to the construction commencement.
7	**Environmental Monitoring**
	Establish appropriate environmental monitoring program. The scope of the monitoring plan are 1) to identify the monitoring tasks, 2) to identify the nature and the schedule of the monitoring, and 3) to identify samples to be taken for analysis and parameters to be measured.
8	**Public Involvement**

	Describe contents of both stakeholder meetings and information disclosures, held for selected pre-feasibility projects. Followings are major items to be checked within this item, **Stakeholder Meeting** (1) Entire Schedule of stakeholder meeting (e.g., dates and places) (2) List of Participants (3) Minutes of Meeting (4) Handouts and/or brochures, used for the public participation process. **Information Disclosure** (1) Outline of entire information disclosure process (dates and the ways of disclosures: Internet, library, newspaper and others). (2) Disclosure (public review) periods (3) Comments and/or questions collected from information disclosure.

(Source: This Study, 2012)

Table-6.5.2 Baseline Environmental and Social Conditions

1. Bio-Physical condition
1) Regional hydrology (e.g., major tributaries, channels, regional water balance) 2) Water quality of surface/subsurface within the study area. 3) Air quality 4) Regional drainage 5) Roadside noise/vibration/air quality 6) Climate 7) Geology 8) Disaster Records (e.g., past earthquake, landslide, inundation or flood events) 9) Soil/sediment 10) Biological Environment
2. Socio-Cultural condition
1) Cultural (historical and archaeological) resources (e.g., Ruins, memorial facilities, historic spots and others) 2) Visual resources (e.g., scenic zones, townscape) 3) Land take/resettlements (e.g., conditions of existing roadside building) 4) Illegal squatter 5) Land use 6) Water use (e.g., water supply system, well and others) 7) School, hospital, park, library, religious facilities. 8) Waste Disposal Site (location, capacity, treatment method) 9) Vehicle Registration 10) Vehicle Inspection/Maintenance Program 11) Clean Fuel Program 12) Sewage system
3. Pollution

1) Roadside Air Quality 2) Roadside Noise 3) Roadside Vibration 4) Soil Contamination 5) Sediment Contamination 6) Water Contamination 7) Bad odor

(Source, This Study, 2012)

Table-6.5.3 List of Field Environmental Studies

1. Roadside Air Quality
Carry out 24-hours continuous survey at five (5) points across the study area. Parameter: PM10, CO, HC, NOX, and SOX Traffic volume by vehicle type Survey Campaign: At least twice (once in rainy season and the other in dry season). Note that one survey point shall be for baseline air quality condition across Jakarta City, that would represent the air quality environment without significant negative impacts from nearby traffic volume.
2. Roadside Noise
Carry out 24-hours continuous survey at five (5) points across the study area. Parameter: Leq Traffic volume by vehicle type Survey Campaign: At least twice (once in rainy season and the other in dry season). Note that one survey point shall be for baseline noise condition across Jakarta City, that would represent the noise environment without significant negative impacts from nearby traffic volume.
3. Roadside Vibration
Carry out 24-hours continuous survey at five (5) points across the study area. Parameter: L_{10} Traffic volume by vehicle type Survey Campaign: At least twice (once in rainy season and the other in dry season). Note that one survey point shall be for baseline vibration condition across Jakarta City, that would represent the vibration environment without significant negative impacts from nearby traffic volume.
4. Soil Survey
Soil survey is to be carried out at five (5) points in total across the study areas in order to obtain the baseline soil characteristics data that would support the identification of potential soil contaminated sites. Several heavy metal and other contaminant parameters such as arsenic, PCB, Chrome, iron, lead, zinc and mercury are of concern.
5. Sediment Survey

Sediment survey is to be carried out at eight (8) points in total across the proposed construction areas, inside and nearby Banjir Kanal in order to obtain the baseline port sediment characteristics data that would support the identification of potential soil contaminated sites. Several heavy metal and other contaminant parameters such as arsenic, PCB, Chrome, iron, lead, zinc and mercury are of concern.
6. Water Quality Survey
Two (2) sampling points in total shall be designated along Banjir Kanal around the study area (e.g., one point at downstream site and the other at the upstream site). Ten parameters such as pH, turbidity, DO, BOD, COD, conductivity, temperature, SS, E-Coli form and Total Coli form are of concern. Available current water quality data from the competent agencies and/or organizations, is to be examined to improve the credibility of the whole water quality data collected by this study.
7.Groundwater Quality Survey
Three (3) or Four (4) sampling points in total shall be designated around the study area. Exact number of sampling points for well shall be determined based on the existing groundwater usage information, to be addressed the proposed baseline environmental and social information collection (see Table 6.5.2 for more detailed descriptions). Ten parameters such as pH, turbidity, DO, BOD, COD, conductivity, temperature, SS, E-Coli form and Total Coli form are of concern. Available current water quality data from the competent agencies and/or organizations, is to be examined to improve the credibility of the whole water quality data collected by this study.
8. Hydrological Study
7.1 Literature Review Carry out literature review/or database search that would contain appropriate regional hydrological info, based on the available hydrological and/or meteorological data such as, a) Rain b) Regional Groundwater Level c) Groundwater pumping rate (location included) d) Evapo-transpiration data e) Regional Drainage System 7.2 Regional Water Balance a) Analyze regional water balance under non-flood condition (dry and rainy season) b) Analyze regional water balance under flood events.
9. Tree Inventory Survey

Tree inventory survey is carried out at green areas, located within the area of concerns in order to grasp the existing tree inventory and prepare for the permit application for tree-cutting to be required for the implementation of the proposed project.

Methodology

1) Determine the green areas, located inside of the area of concern.
2) Prepare tree inventory by grasping following information,
   a) Name of Tree (academic, English and local name)
   b) GPS Coordinate
   c) DBH (Diameter at Breast Height)
   d) Photo records of each tree.
   e) IUCN-status
   f) Others
3) Prepare tree distribution and/or vegetation map.

(Source, This Study, 2012)

Table-6.5.4 List of Relevant Socio Cultural Studies

1. Socio-Cultural Survey
Community participation plays an important role for proper infrastructure project planning and management. It is essential to examine variety of aspects of the proposed project based on the current community's needs or priority. A questionnaire-based socio-cultural survey is to be carried out in order to grasp the public opinion about this proposed project as well as current concerns about urban transport system of Jakarta from nearby community properly. It is recommended to have 500 interviews (or samples) inside and/outside of the study area. The opinion survey sheet will be provided to local consultant from JICA Study Team.
2. LARAP-related Survey
As mentioned in Section 6.1, the study area is classified as mixed residential/commercial area, and have certain amounts of private properties such as house and/or office complex are to be affected by the implementation of the proposed project. Survey items such as the inventory of the property owners, type of property (e.g., house, multi-tenant building and others), lease agreement and others shall be developed based on the Law #2 of 2012, JICA Guideline as well as relevant laws and/or regulations.
3. LARAP-related Survey (illegal squatters)
Some communities of illegal squatters exist along the existing railway line. According to JICA Guideline, it is recommended to take appropriate social considerations for those communities in case of expropriation. Followings are majors items to be summarized within this study, a) Property owner and his/or her household structure (# of family member) b) Length of stay c) Type of Housing d) Occupation e) Reason to settle this current place.

f) Willing to move out if requested.
g) Others

(Source: This Study, 2012)

Table-6.5.5 Study Schedule of EIA and LARAP Studies (Estimated)

	1 2 3 4 5 6 7 8 9 10 11 12 13 14 (month)
1. EIA & LARAP Tender Preparation.	———
2. Selection of EIA & LARAP Consultants	———
3. EIA Study	————————————————
4. LARAP Study	————————————————
5. EIA Approval	☆
6. LARAP Approval	☆
7. Tree-cutting Permit Approval	☆
8. Environmental & Social Monitoring	- - - - - -

(Source: This Study, 2012)

Note: It is assumed that both EIA and LARAP studies (Steps 3 and 4 of Table 6.5.5) would take ten (10) months.

6.5.4 Directions for Environmental Management Program Development

Within both EIA and LARAP studies, it is mandatory to contain an appropriate environmental management program (EMP) for the successful project implementation. This EMP shall be developed, addressing potential negative impacts, identified through the environmental scoping process (see Table 6.3.6), and proper environmental and social considerations shall be taken during both construction and operation phases. Major tasks of this EMP development work are summarized as follows,

- Development of Monitoring Program (e.g., roadside air quality, noise/vibration, water quality and sediment of Banjir Kanal and others)
- Data processing of all monitoring results
- Framework of project-related complaints handling
- Contingency plans for accidents during construction periods.
- Liaison with relevant stakeholders
- Others

In particular, the establishment of good liaison among DKI Jakarta, BPLHD, surrounding communities, relevant NGOs and others would play vital role for the successful implementation of EMP. Figure 6.5.2 shows the schematic diagram of EMP framework.

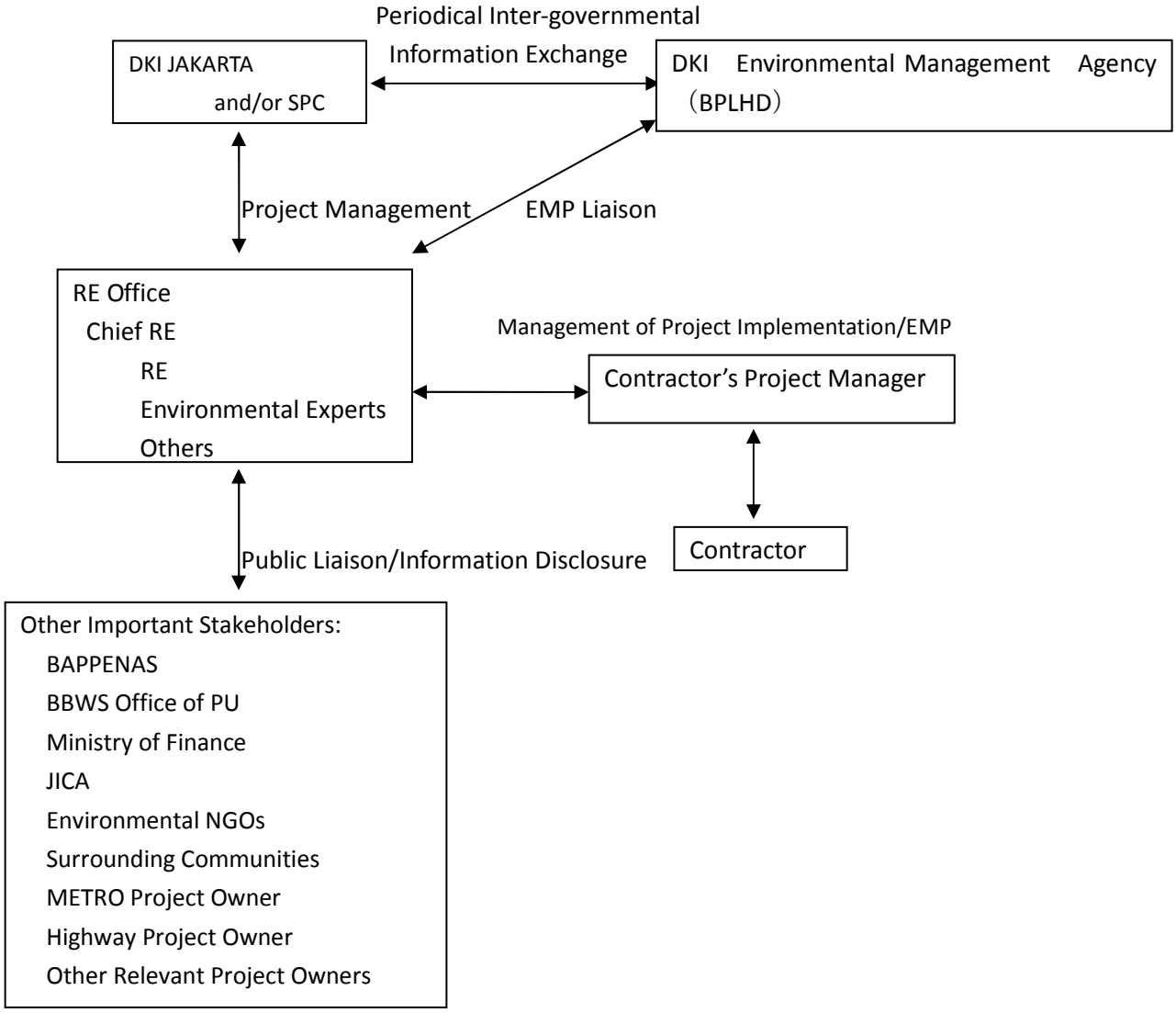


Figure-6.5.2 EMP Framework

(Source: This Study, 2012)

Within the artificial ground construction project, approximately 40 foundation piles are to be set up inside of Bajir Kanal. It is found that some sediments, deposited inside of this canal, are contaminated with toxic heavy metals such as the arsenic (see Table 6.3.1), and some of those contaminated sediments may have physical disturbance due to the construction activities of this proposed project. Also, some of dredged sediment may be used as the refill material for any relevant projects. So, it is essential that EMP of the proposed project shall contain proper treatment methods of these contaminated sediments after the basic design and the construction schedule of the artificial ground is finalized in order to minimize the risk of accidental spreading of these contaminated sediments to surrounding water bodies.

In general, it is preferable to set up an on-site treatment/or removal system after the total amount of contaminated sediment to be dredged is estimated precisely. This estimation shall be conducted, based on the comprehensive sediment survey. It is noted that no guideline for soil/sediment contamination surveys exist in Indonesia. However, in Japan, it is mandatory to conduct soil and/or sediment survey prior to the construction phase, and that survey must has one sediment sampling point at every 100 m^2 (i.e., need to set

up 10 m x 10 m sampling grid) of the area of concerns with two different depths (e.g., 30 cm and 1 m from the sediment surface) at least. Then, based on that survey result and relevant estimation, the most suitable detoxification methods to be applied for the treatment of contaminated sediments shall be selected while preparing an appropriate final disposal site for treated dredged contaminated sediment (see Figure 6.5.3). Within this proposed project, there are two pile foundation sites (20 m x 20m and 8 m x 42 m, respectively) along the canal. So that it would be ideal to have eight (8) sampling sites (i.e., 16 samples shall be collected) within this artificial ground construction project. If it is found that certain amounts of toxic heavy metal are contained within sediments around pile foundation sites, appropriate detoxifying and anti-spreading measures shall be taken promptly.

Currently, Banjir Kanal is dredged periodically throughout the year, and untreated dredged sediment of this canal is delivered to nearby disposal sites, mainly located at Ancol, northern part of Jakarta (PU, personal communication, 2012). These disposal sites are very close to the coastline. Also, the groundwater level around those sites seems to be high and it is highly likely that the seepage between those dumped sediments and local groundwater flows occur, so that some of toxic substances may be transferred into regional groundwater flow, and then eventually reach into the sea water. So that proper treatment shall be taken prior to the dredged sediment disposal in order to avoid accidental, regional spreading of toxic substances, that may be contained within those dredged sediments.

Figure-6.5.3 shows the treatment flowchart of contaminated soil/sediment. First of all, it is important to grasp the baseline sediment condition around the study area prior to construction activities to be taken within the canal. If some sediments are found to contain toxic substances, then appropriate anti-spreading measures as well a sediment treatments shall be taken promptly.

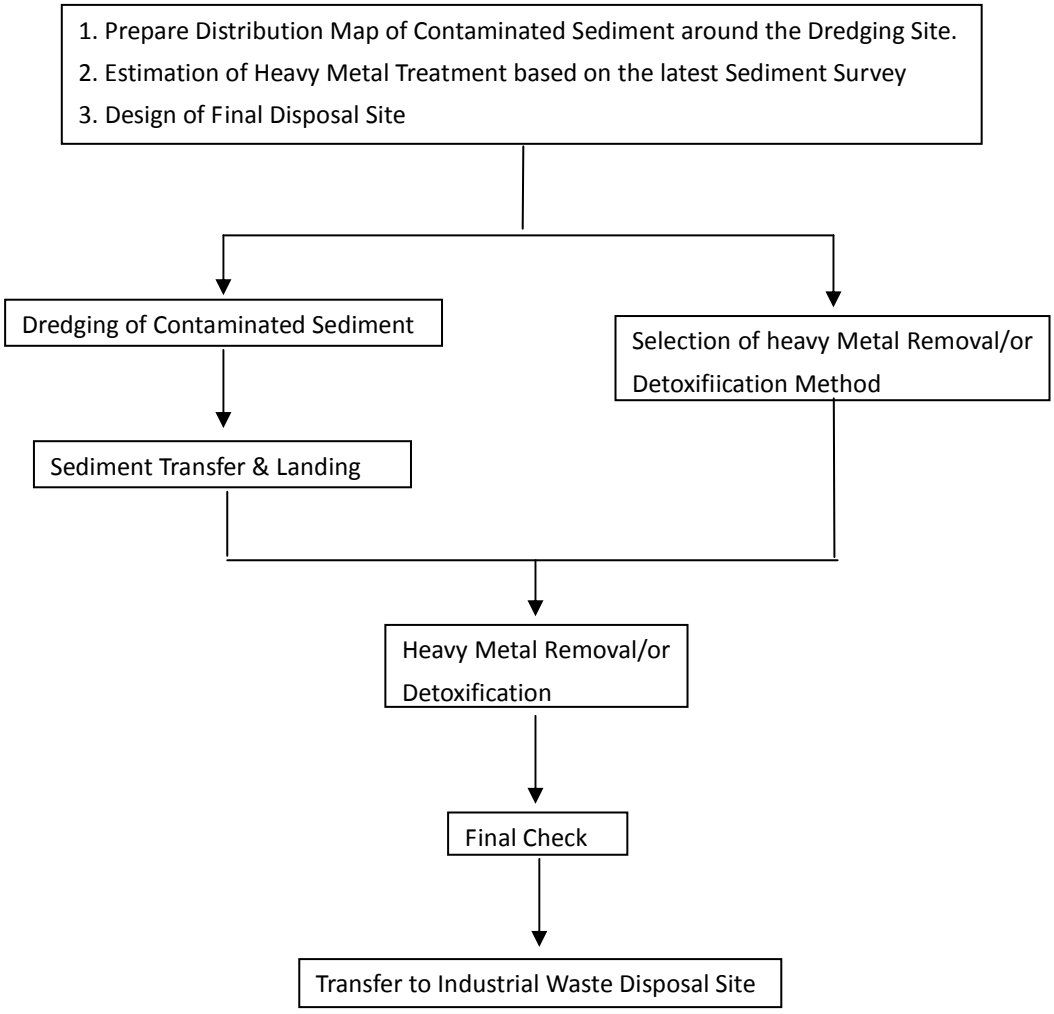


Figure-6.5.3 Flowchart of Contaminated Soil/Sediment Treatment

(Source: This Study, 2012)

Figure-6.5.4 shows the schematic diagram of suggested environmental monitoring activities (i.e., two sediment sampling areas and water quality sampling sites) during the construction period of the artificial ground. By setting water quality sampling sections at both upstream and downstream sides of the construction site, it is possible to detect sudden water quality changes, that may be caused by accidents and/or any construction activities during the construction phase promptly.

On land, it is likely that another type of monitoring activities such as periodical roadside air quality and noise/vibration surveys shall be taken place. Besides, it is important to have close check on the construction waste treatment as well as the greenery management such as tree cuttings, also. Upon considering these facts, a comprehensive environmental management program shall be developed based on engineering results, summarized within the feasibility study to be followed.

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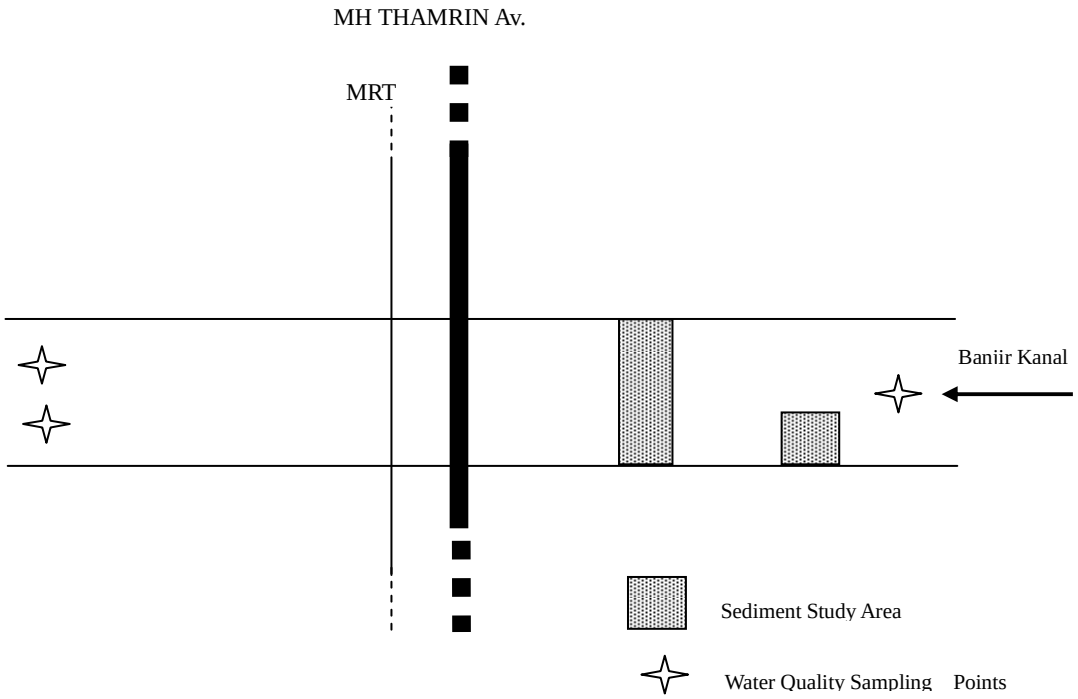


Figure-6.5.4 Suggested Environmental Monitoring Program at Banjir Kanal (Construction Phase)

(Source, This Study, 2012)

6.5.5 Undertaking for Indonesian C/P for Successful Project Implementation

To initiate both EIA and LARAP studies smoothly, it is important to secure a sufficient budget for both studies, and then, select both well-qualified EIA and LARAP consultants (see Section 6.2 for more detailed descriptions). Table 6.5.6 summarizes major tasks to be required for the environmental approval application process of proposed Dukuh Atas redevelopment project

Table-6.5.6 Major Tasks for Environmental Approval Application of Dukuh Atas Redevelopment Project

	Major Tasks
Preparation of EIA and LARAP Studies	0. Set up of environmental division within the project owner, responsible for both EIA and RAP studies. 1. ToR development of both EIA and LARAP 2. Securing budgets for both EIA and LARAP studies. 3. Preliminary discussion with BPLHD & official application of environmental license. 4. Tender preparation of both EIA and LARAP studies 5. Selection of both EIA and LARAP Consultants
EIA and LARAP	1. Official Discussion with BPLHD during both EIA and LARAP studies.

Studies	2. Preparation of Public Meeting 3. Public meeting. Followings are major topics to be addressed within those meetings, ・Redevelopment Project Outline ・ToR (draft) of（relevant environmental and social studies ・Collection of comments/opinions/questions and/or advices on ToR (draft) 4. ToR finalization and its approval from BPLHD 5. Implementation of both EIA and LARAP studies 6. Submission of both EIA and LARAP study reports (D/F)
Examination by BPLHD	1.Set up of EIA Review Committee, and then, examination of both reports are to be conducted by this committee. 2. Feedback committee's examination results to both EIA and LARAP D/F Reports. 3. Preparation of both EIA and LARAP Final Reports 4. Examination of both EIA and LARAP Final Reports and those approval

As mentioned earlier, it is likely that more than 200 houses are to be affected within this proposed redevelopment project, so that the establishment of a constructive public involvement would play vital role for successful project implementation. Within the IPTD II project (Indonesia Power Transmission Development, Phase II: 2011 – 2020), financed by World Bank, four (4) public meetings were held during entire LARAP study period. It is preferable to have multiple stakeholder meetings including community meetings within this proposed Dukuh Atas Redevelopment Project in order to achieve the positive public involvement and successful project implementation.

Chapter 7. Project Effectiveness

Operational and effectiveness indicators are recommended for Phase 1 and Phase 2 of the project that involve the development of public facilities (underground walkway and artificial ground), and the subsequent Phase 2 portion for private sector facilities. Recommendations are also provided for the effect of this project on the MRT project.

As an economic analysis of the project, the social benefit of urban redevelopment is also measured, and the Economic Internal Rate of Return (EIRR) for the project is calculated.

7.1 Establishment of performance indicators

Performance indicators are standards for assessing the degree to which the objectives of public policy and public works projects have been achieved. Performance indicators are measured continuously from the planning stage (ex-ante) to the point following completion (ex-post). This makes it possible to collect coherent data on policy and project achievements.

Recommendations are provided for operational indicators (which measure the degree to which the equipment, facilities, etc., constructed for the project are being operated and used appropriately) and effectiveness indicators (which measure the degree to which these equipment, facilities, etc., are providing benefits to beneficiaries and the target community).

7.1.1 Indicators for public facilities development

The following table shows the operational and effectiveness indicators established for public facility development (underground walkway, artificial ground, etc.) in Phase 1 and Phase 2 of the project. Measurements are taken continuously and the degree to which the objectives have been achieved is assessed.

Table 7.1.1 Operational and effectiveness indicators for public facilities development

Source: JICA Study Team

	Facility name	Operational indicator (unit)	Effectiveness indicator (unit)
1	Passageways relating to the underground pedestrian crossing	User traffic volume (persons/day)	Reduction in travel time and transfer time (amount of time/year)
2	Artificial ground	BRT daily traffic volume (vehicles/day) Taxi and bus daily traffic volume (vehicles/day)	Reduction in transfer time (amount of time/year) Average wait time (minutes) Improvement in congestion status (persons/m^2) Increase in land price due to effect of greening spaces (Rp/m^2)
		Number of users (persons/day)	

7.1.2 Indicators for urban redevelopment project

The following table shows the operational and effectiveness indicators established for urban redevelopment in Phase 2 of the project. Measurements are taken continuously and the degree to which the objectives have been achieved is assessed.

Table 7.1.2 Operational and Effectiveness Indicators of

Source: JICA Study Team

	Facility name	Operational indicator (unit)	Effectiveness indicator (unit)
1	Urban redevelopment	Percentage of reduced walking time (%)	Increase in land price (Rp/m^2)
		Greening ratio (%)	
		Floor area ratio (%)	Increase in land price (Rp/m^2)

7.2 Effect on MRT Project

1) TOD Approach Adaptation Effect

Transit Oriented Development (Public transport oriented development) approaches is expected to be well adapted by passengers and people in Jakarta with the implementation of this Project that plans to open Underground Walkway and Artificial Ground by MRT line opening. MRT lines will offer a new TOD means and pedestrian network development will bring more swift and comfortable move of the people that further appeal the benefit of TOD approaches.

2) Transport Hub Effect in the central part of Jakarta with railway network improvement

Several railway network improvement including MRT planned or scheduled and Trans Jakarta connection at Dukuh Atas area in the heart of Jakarta will be enhanced with their reinforced role as the transport hub.

3) Traffic Accident Reduction / Traffic Jam Easing Effect

Underground Walkway providing a jump increase of MRT passengers transfer to other transport means, and Artificial Ground offering direct access of Trans Jakarta on the platform will contribute to reduction of traffic accidents in the area as well as traffic congestion easing.

4) Public Facility and Public Service Improvement Effect

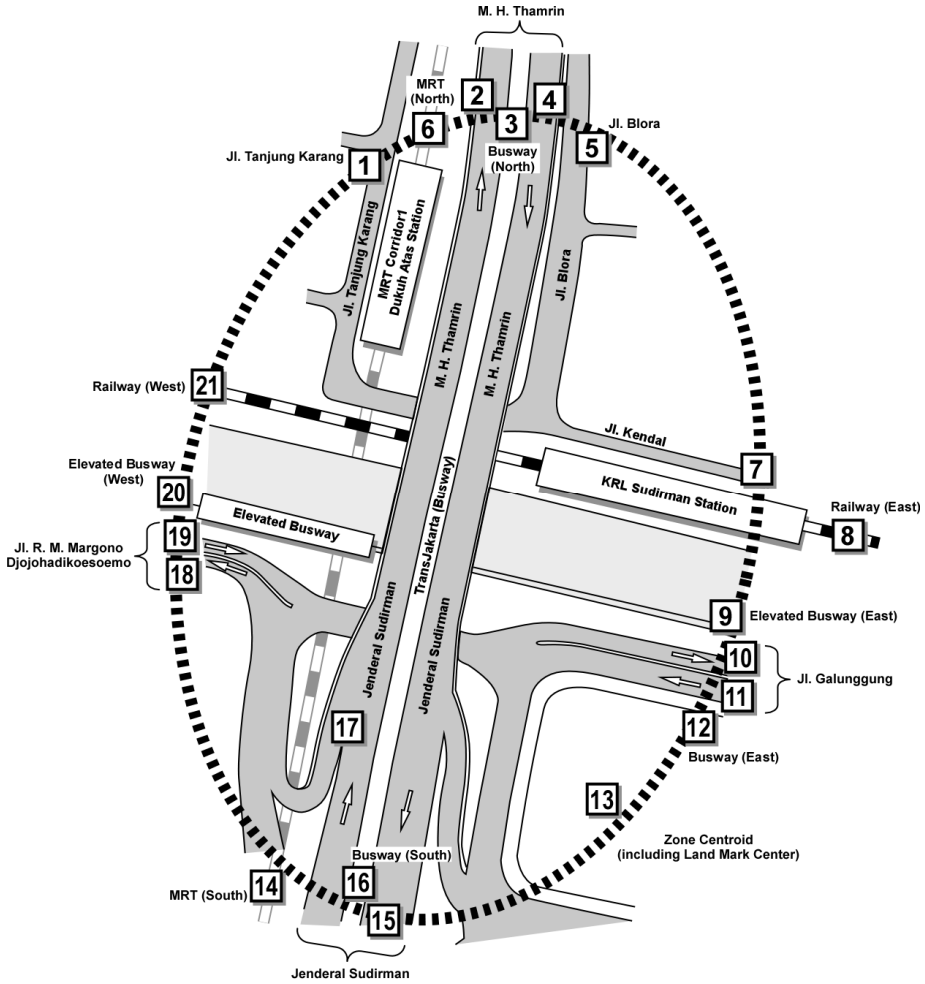
Urban redevelopment of the area will create new roads and parks as well as additional public facilities such as satellite offices of neighboring districts, a kindergarten for commuters, a health care center, and a tourist information office, thereby improving the quality of public services. This will increase the number of people who will use MRT and other public transport for the purpose of using these facilities.

5) Private sector facilities construction and operation Effect

Private sector facilities will offer new commercial facilities to give more comfort to not only MRT and other transport passengers but also daily users and residents nearby.

Appendix 1. Predicted rider flows at Dukuh Atas based on ramp analysis

For the sake of calculating demand by direction and mode of transportation for riders getting on and off or transferring between different modes of transportation at the station and bus stops, the ramps surrounding Dukuh Atas were identified as part of a demand allocation network as shown in the figure below.



Source: Study Team

Figure-A1-1. Ramp numbers on the demand allocation network

The results of analyses as to which ramps and which modes will be used to enter and leave the area for trips through the area surrounded by this ramp are shown starting on the next page. The table below is an example of the results of ramp analysis.

Table-A1-1. Example of ramp analysis results

From RAMP	To RAMP	Inbound for Dukuh Atas						Outbound for Dukuh Atas					
		by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total	by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total
4	8	3,588	2,461	0	0	0	6,049	0	0	0	0	6,049	6,049

Source: Study Team

In this example, 3,588 people arrive on foot and 2,461 people arrive by regular bus routes from the north side of Sudirman Street, and they all get on a train at KRL Sudirman Station and head eastward. Incidentally, this model includes walking and riding regular bus routes as categories, but users of para-transit such as taxis and bajaj, which are not given as categories in the model, are also included under these modes of transportation.

Table-A1-2. Weekday flows in 2017 (Source: Study Team)

From RAMP	To RAMP	Inbound						Outbound						Inbound						Outbound					
		by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total	by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total	by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total	by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total
4	8	2,444	1,676	0	0	0	4,120	0	0	0	0	4,120	4,120	0	0	0	0	0	0	0	0	0	0	0	0
4	10	0	14	0	0	0	14	6	8	0	0	0	14	20	0	0	0	0	20	20	0	0	0	0	20
4	12	878	765	0	0	0	1,643	1,042	0	0	1,643	0	1,643	386	0	0	0	0	386	366	20	0	0	0	386
4	13	644	398	0	0	0	1,042	1,042	0	0	0	0	1,042	464	0	0	0	0	464	464	0	0	0	464	464
4	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	0	0	96	93	3	0	0	0	96
4	15	227	33,033	0	0	0	33,260	227	33,033	0	0	0	33,260	0	0	8,176	0	0	8,176	0	0	8,176	0	0	8,176
4	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0	0	29	29	0	0	0	0	29
4	17	712	862	0	0	0	1,574	1,574	0	0	0	0	1,574	0	0	5,419	0	0	5,419	0	0	0	0	5,419	5,419
4	18	1,134	135	0	0	0	1,269	1,269	0	0	0	0	1,269	0	0	39	0	0	39	5	35	0	0	0	39
4	21	255	134	0	0	0	389	389	0	0	0	0	389	0	0	6,413	0	0	6,413	0	0	0	6,413	0	6,413
5	8	903	0	0	0	0	903	903	0	0	0	0	903	14	13	407	0	0	407	407	0	0	0	0	407
6	7	0	0	0	0	0	0	0	0	0	0	0	0	14	17	670	0	0	670	670	0	0	0	0	670
6	8	0	0	0	0	0	0	0	0	0	0	0	0	14	18	15	0	0	15	15	0	0	0	0	15
6	10	0	0	0	0	0	0	0	0	0	0	0	0	14	21	13	0	0	13	0	0	0	0	13	13
6	12	0	0	0	0	0	0	0	0	0	0	0	0	16	2	0	0	0	0	0	0	0	0	0	0
6	13	0	0	0	0	0	0	0	0	0	0	0	0	16	6	0	0	0	0	0	0	0	0	0	0
6	14	0	0	7,972	0	0	7,972	7,972	0	0	0	0	7,972	16	7	0	0	0	0	0	0	0	0	0	0
6	15	0	0	0	0	0	0	0	0	0	0	0	0	16	8	0	0	0	0	0	0	0	0	0	0
6	16	0	0	0	0	0	0	0	0	0	0	0	0	16	12	0	0	0	0	0	0	0	0	0	0
6	17	0	0	0	0	0	0	0	0	0	0	0	0	16	13	0	0	0	0	0	0	0	0	0	0
6	18	0	0	0	0	0	0	0	0	0	0	0	0	16	17	0	0	0	0	0	0	0	0	0	0
6	21	0	0	0	0	0	0	0	0	0	0	0	0	16	21	0	0	0	0	0	0	0	0	0	0
8	2	0	0	0	0	4,861	4,861	2,971	1,890	0	0	0	4,861	17	2	40,876	0	0	41,542	619	40,923	0	0	0	41,542
8	6	0	0	0	0	0	0	0	0	0	0	0	0	17	6	0	0	0	0	0	0	0	0	0	0
8	7	0	0	0	0	510	510	510	0	0	0	0	510	17	7	49	0	0	310	310	0	0	0	0	310
8	12	0	0	0	0	47	47	0	0	0	47	0	47	17	8	4,148	0	0	7,064	0	0	0	0	7,064	7,064
8	13	0	0	0	0	815	815	815	0	0	0	0	815	17	10	78	0	0	200	195	5	0	0	0	200
8	14	0	0	0	0	4,364	4,364	2,613	4,863	4,364	0	0	4,364	17	12	351	0	0	4,584	0	0	4,584	0	0	4,584
8	15	0	0	0	0	7,476	7,476	0	0	0	0	0	7,476	17	13	754	0	0	1,812	1,812	0	0	0	0	1,812
8	16	0	0	0	0	0	0	0	0	0	0	0	0	17	14	0	0	0	779	0	0	779	0	0	779
8	17	0	0	0	0	1,220	1,220	1,220	0	0	0	0	1,220	17	15	0	0	0	1,971	432	1,539	0	0	0	1,971
8	21	0	0	0	0	47,317	47,317	0	0	0	0	47,317	47,317	17	16	0	0	0	0	0	0	0	0	0	0
11	13	28	0	0	0	0	28	28	0	0	0	0	28	17	18	231	0	0	3,983	3,976	7	0	0	0	3,983
11	14	8	0	0	0	0	8	8	0	0	8	0	8	17	21	0	0	0	1,635	0	0	0	0	1,635	1,635
11	15	207	0	0	0	0	207	145	62	0	0	0	207	19	2	0	0	0	1,343	807	536	0	0	0	1,343
11	17	35	0	0	0	0	35	35	0	0	0	0	35	19	6	0	0	0	0	0	0	0	0	0	0
11	18	61	3,007	0	0	0	3,068	61	3,007	0	0	0	3,068	19	7	243	0	0	243	243	0	0	0	0	243
11	21	3	0	0	0	0	3	0	0	0	0	3	3	19	8	12	8	0	20	0	20	0	0	20	20
12	2	0	0	0	2,977	0	2,977	1,597	1,380	0	0	0	2,977	19	10	72	2,514	0	2,586	72	2,514	0	0	0	2,586
12	6	0	0	0	0	0	0	0	0	0	0	0	0	19	12	611	0	0	611	0	0	611	0	0	611
12	13	0	0	0	1,194	0	1,194	1,194	0	0	0	0	1,194	19	13	343	18	0	361	361	0	0	0	0	361
12	14	0	0	0	8,967	0	8,967	0	0	8,967	0	0	8,967	19	14	52	0	0	52	0	0	52	0	0	52
12	15	0	0	0	5,793	0	5,793	5,527	266	0	0	0	5,793	19	15	658	0	0	658	527	131	0	0	0	658
12	16	0	0	0	0	0	0	0	0	0	0	0	0	19	17	3,207	0	0	3,207	3,207	0	0	0	0	3,207
12	17	0	0	0	1,572	0	1,572	1,572	0	0	0	0	1,572	21	2	0	0	0	4,113	2,633	1,480	0	0	0	4,113
12	18	0	0	0	1,050	0	1,050	1,050	0	0	0	0	1,050	21	6	0	0	0	0	0	0	0	0	0	0
12	21	0	0	0	2,199	0	2,199	0	0	0	0	2,199	2,199	21	7	0	0	0	848	848	0	0	0	0	848
13	2	830	0	0	0	0	830	132	698	0	0	0	830	21	8	0	0	0	50,561	0	0	0	0	50,561	50,561
13	6	0	0	0	0	0	0	0	0	0	0	0	0	21	10	0	0	0	15	15	0	0	0	0	15
13	7	222	0	0	0	0	222	222	0	0	0	0	222	21	12	0	0	0	2,700	0	0	2,700	0	0	2,700
13	8	867	0	0	0	0	867	0	0	0	0	867	867	21	13	0	0	0	617	617	0	0	0	0	617
13	10	36	0	0	0	0	36	16	20	0	0	0	36	21	14	0	0	0	426	0	0	426	0	0	426
13	12	992	0	0	0	0	992	0	0	0	992	0	992	21	15	0	0	0	1,699	1,476	223	0	0	0	1,699
13	14	324	0	0	0	0	324	0	0	324	0	0	324	21	16	0	0	0	0	0	0	0	0	0	0
13	15	1,932	0	0	0	0	1,932	1,049	883	0	0	0	1,932	21	17	0	0	0	1,243	1,243	0	0	0	0	1,243

Table-A1-3. Peak morning flows in 2017 (Source: Study Team)

Inbound									Outbound									
From RAMP	To RAMP	by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total		by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total				
4	8	32	9	0	0	0	41		41	0	0	0	41	41				
4	10	0	0	0	0	0	0		0	0	0	0	0	0				
4	12	35	23	0	0	0	58		58	0	0	0	0	58				
4	13	66	53	0	0	0	119		119	0	0	0	0	119				
4	14	0	0	0	0	0	0		0	0	0	0	0	0				
4	15	22	2,524	0	0	0	2,546		2,546	2,524	0	0	0	2,546				
4	16	0	0	0	0	0	0		0	0	0	0	0	0				
4	17	83	129	0	0	0	212		212	0	0	0	0	212				
4	18	130	25	0	0	0	155		155	0	0	0	0	155				
4	21	7	3	0	0	0	10		10	0	0	0	10	10				
5	8	20	0	0	0	0	20		20	0	0	0	20	20				
6	7	0	0	0	0	0	0		0	0	0	0	0	0				
6	8	0	0	0	0	0	0		0	0	0	0	0	0				
6	10	0	0	0	0	0	0		0	0	0	0	0	0				
6	12	0	0	0	0	0	0		0	0	0	0	0	0				
6	13	0	0	0	0	0	0		0	0	0	0	0	0				
6	14	0	0	550	0	0	550		550	0	0	0	0	550				
6	15	0	0	0	0	0	0		0	0	0	0	0	0				
6	16	0	0	0	0	0	0		0	0	0	0	0	0				
6	17	0	0	0	0	0	0		0	0	0	0	0	0				
6	18	0	0	0	0	0	0		0	0	0	0	0	0				
6	21	0	0	0	0	0	0		0	0	0	0	0	0				
8	2	0	0	0	0	1,134	1,134		1,134	433	0	0	0	1,134				
8	6	0	0	0	0	0	0		0	0	0	0	0	0				
8	7	0	0	0	0	88	88		88	88	0	0	0	88				
8	12	0	0	0	0	9	9		9	0	0	0	9	9				
8	13	0	0	0	0	180	180		180	180	0	0	0	180				
8	14	0	0	0	0	466	466		466	0	466	0	0	466				
8	15	0	0	0	0	1,731	1,731		1,731	652	1,079	0	0	1,731				
8	16	0	0	0	0	0	0		0	0	0	0	0	0				
8	17	0	0	0	0	286	286		286	286	0	0	0	286				
8	21	0	0	0	0	6,636	6,636		6,636	0	0	0	6,636	6,636				
11	13	0	0	0	0	0	0		0	0	0	0	0	0				
11	14	0	0	0	0	0	0		0	0	0	0	0	0				
11	15	13	0	0	0	0	13		13	13	0	0	0	13				
11	17	0	0	0	0	0	0		0	0	0	0	0	0				
11	18	0	307	0	0	0	307		307	307	0	0	0	307				
11	21	0	0	0	0	0	0		0	0	0	0	0	0				
12	2	0	0	0	598	0	598		598	253	0	0	0	598				
12	6	0	0	0	0	0	0		0	0	0	0	0	0				
12	13	0	0	0	177	0	177		177	177	0	0	0	177				
12	14	0	0	0	772	0	772		772	0	772	0	0	772				
12	15	0	0	0	1,331	0	1,331		1,330	20	0	0	0	1,330				
12	16	0	0	0	0	0	0		0	0	0	0	0	0				
12	17	0	0	0	283	0	283		283	283	0	0	0	283				
12	18	0	0	0	189	0	189		189	189	0	0	0	189				
12	21	0	0	0	164	0	164		164	0	0	0	164	164				
13	2	55	0	0	0	0	55		55	48	0	0	0	55				
13	6	0	0	0	0	0	0		0	0	0	0	0	0				
13	7	18	0	0	0	0	18		18	18	0	0	0	18				
13	8	1	0	0	0	0	1		1	0	0	0	1	1				
13	10	2	0	0	0	0	2		2	2	0	0	0	2				
13	12	13	0	0	0	0	13		13	0	0	13	0	13				
13	14	2	0	0	0	0	2		2	0	2	0	0	2				
13	15	155	0	0	0	0	155		155	125	30	0	0	155				

Inbound									Outbound									
From RAMP	To RAMP	by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total		by Walk	by Ordinary Buses	by MRT	by BRT	by Railway	Total				
13	16	0	0	0	0	0	0		0	0	0	0	0	0				
14	17	2	0	0	0	0	2		2	2	0	0	0	2				
14	18	17	0	0	0	0	17		17	15	2	0	0	17				
14	21	5	0	0	0	0	5		5	0	0	0	0	5				
15	16	0	0	0	0	0	0		0	0	0	0	0	0				
15	17	16	0	0	0	0	16		16	16	0	0	0	16				
15	18	5	0	0	0	0	5		5	0	0	0	0	5				
15	21	0	0	0	0	0	0		0	0	0	0	0	0				
16	2	0	0	0	0	0	0		0	0	0	0	0	0				
16	6	0	0	0	0	0	0		0	0	0	0	0	0				
16	7	0	0	0	0	0	0		0	0	0	0	0	0				
16	8	0	0	0	0	0	0		0	0	0	0	0	0				
16	12	0	0	0	0	0	0		0	0	0	0	0	0				
16	13	0	0	0	0	0	0		0	0	0	0	0	0				
16	17	0	0	0	0	0	0		0	0	0	0	0	0				
16	18	0	0	0	0	0	0		0	0	0	0	0	0				
16	21	0	0	0	0	0	0		0	0	0	0	0	0				
17	2	71	5,628	0	0	0	5,699		5,699	0	0	0	0	5,699				
17	6	0	0	0	0	0	0		0	0	0	0	0	0				
17	7	17	7	0	0	0	24		24	25	0	0	0	25				
17	8	21	71	0	0	0	92		92	0	0	0	0	92				
17	12	12	0	0	0	0	0		0	0	0	0	0	0				
17	13	99	7	0	0	0	106		24	0	0	0	0	24				
17	14	125	119	0	0	0	244		244	244	0	0	0	244				
17	15	17	0	0	0	0	17		17	0	0	0	0	17				
17	16	92	0	0	0	0	92		92	43	49	0	0	92				
17	17	0	0	0	0	0	0		0	0	0	0	0	0				
17	18	410	53	0	0	0	463		463	463	0	0	0	463				
17	21	134	0	0	0	0	134		134	0	0	0	0	134				
19	2	139	0	0	0	0	139		139	101	39	0	0	140				
19	6	0	0	0	0	0	0		0	0	0	0	0	0				
19	7	23	0	0	0	0	23		23	23	0	0	0	23				
19	8	1	1	0	0	0	2		2	0	0	0	2	2				
19	10	13	310	0	0	0	323		323	13	310	0	0	323				
19	12	42	0	0	0	0	42		42	0	0	0	42	42				
19	13	51	2	0	0	0	53		53	53	0	0	0	53				
19	14	3	0	0	0	0	3		3	0	0	3	0	3				
19	15	85	0	0	0	0	85		85	77	8	0	0	85				
19	17	418	0	0	0	0	418		418	418	0	0	0	418				
21	2	0	0	0	0	1,029	1,029		1,029	659	370	0	0	1,029				
21	6	0	0	0	0	0	0		0	0	0	0	0	0				
21	7	0	0	0	0	134	134		134	134	0	0	0	134				
21	8	0	0	0	0	3,679	3,679		3,679	0	0	0	3,679	3,679				
21	10	0	0	0	0	0	0		0	0	0	0	0	0				
21	12	0	0	0	0	334	334		334	334	0	0	0	334				
21	13	0	0	0	0	140	140		140	140	0	0	0	140				
21	14	0	0	0	0	11	11		11	0	0	11	0	11				
21	15	0	0	0	0	380	380		380	327	53	0	0	380				
21	16	0	0	0	0	0	0		0	0	0	0	0	0				
21	17	0	0	0	0	193	193		193	193	0	0	0	193				

Table-A1-4. Peak afternoon flows in 2017 (Source: Study Team)

From RAMP	To RAMP	Inbound						Outbound							Inbound						Outbound					
		by Walk	by Ordinary Busses	by MRT	by BRT	by Railway	Total	by Walk	by Ordinary Busses	by MRT	by BRT	by Railway	Total	From RAMP	To RAMP	by Walk	by Ordinary Busses	by MRT	by BRT	by Railway	Total	by Walk	by Ordinary Busses	by MRT	by BRT	by Railway	Total
4	8	495	313	0	0	0	808	0	0	0	0	808	808	13	16	0	0	0	0	0	0	0	0	0	0	0	0
4	10	0	0	0	0	0	0	0	0	0	0	0	0	13	17	0	0	0	0	0	0	0	0	0	0	0	0
4	12	154	111	0	0	0	265	0	0	0	265	0	265	13	18	31	0	0	0	0	31	31	0	0	0	0	31
4	13	33	16	0	0	0	49	49	0	0	0	0	49	13	21	58	0	0	0	0	58	58	0	0	0	58	58
4	14	0	0	0	0	0	0	0	0	0	0	0	0	14	2	0	0	0	0	0	0	4	0	0	0	0	4
4	15	7	3,839	0	0	0	3,846	0	3,839	0	0	0	3,846	14	6	0	0	487	0	0	487	487	0	0	0	0	487
4	16	0	0	0	0	0	0	0	0	0	0	0	0	14	7	0	0	0	0	0	0	0	0	0	0	0	0
4	17	34	48	0	0	0	82	82	0	0	0	0	82	14	8	0	0	434	0	0	434	434	0	0	0	434	434
4	18	64	7	0	0	0	71	71	0	0	0	0	71	14	10	0	0	530	0	0	530	530	0	0	0	0	530
4	21	55	28	0	0	0	83	83	0	0	0	83	83	14	12	0	0	0	0	0	0	0	0	0	0	0	0
5	8	202	0	0	0	0	202	202	0	0	0	202	202	14	13	0	0	0	0	0	0	14	0	0	0	0	14
6	7	0	0	0	0	0	0	0	0	0	0	0	0	14	17	0	0	0	0	0	0	0	0	0	0	0	0
6	8	0	0	0	0	0	0	0	0	0	0	0	0	14	18	0	0	0	0	0	0	0	0	0	0	0	0
6	10	0	0	0	0	0	0	0	0	0	0	0	0	14	21	0	0	0	0	0	0	0	0	0	0	0	0
6	12	0	0	0	0	0	0	0	0	0	0	0	0	16	2	0	0	0	0	0	0	0	0	0	0	0	0
6	13	0	0	0	0	0	0	0	0	0	0	0	0	16	6	0	0	0	0	0	0	0	0	0	0	0	0
6	14	0	0	1,036	0	0	1,036	1,036	0	0	0	0	1,036	16	7	0	0	0	0	0	0	0	0	0	0	0	0
6	15	0	0	0	0	0	0	0	0	0	0	0	0	16	8	0	0	0	0	0	0	0	0	0	0	0	0
6	16	0	0	0	0	0	0	0	0	0	0	0	0	16	12	0	0	0	0	0	0	0	0	0	0	0	0
6	17	0	0	0	0	0	0	0	0	0	0	0	0	16	13	0	0	0	0	0	0	0	0	0	0	0	0
6	18	0	0	0	0	0	0	0	0	0	0	0	0	16	17	0	0	0	0	0	0	0	0	0	0	0	0
6	21	0	0	0	0	0	0	0	0	0	0	0	0	16	21	0	0	0	0	0	0	0	0	0	0	0	0
8	2	0	0	0	0	0	0	0	0	0	0	0	0	17	2	35	2,498	0	0	0	2,533	34	2,499	0	0	0	2,533
8	6	0	0	0	0	0	0	0	0	0	0	0	0	17	6	0	0	0	0	0	0	0	0	0	0	0	0
8	7	0	0	0	0	0	0	0	0	0	0	0	0	17	7	30	0	0	0	0	30	30	0	0	0	0	30
8	12	0	0	0	0	0	0	0	0	0	0	0	0	17	8	609	793	0	0	0	1,402	0	0	0	0	1,402	1,402
8	13	0	0	0	0	0	0	0	0	0	0	0	0	17	10	5	0	0	0	0	5	5	0	0	0	0	5
8	14	0	0	0	0	0	0	0	0	158	0	0	158	17	12	630	71	0	0	0	701	701	0	0	0	0	701
8	15	0	0	0	0	0	0	0	0	0	0	0	0	17	13	60	11	0	0	0	71	71	0	0	0	0	71
8	16	0	0	0	0	0	0	0	0	0	0	0	0	17	14	136	0	0	0	0	136	0	0	136	0	0	136
8	17	0	0	0	0	0	0	0	0	0	0	0	0	17	15	266	0	0	0	0	266	33	233	0	0	0	266
8	21	0	0	0	0	0	0	0	0	0	0	0	0	17	16	0	0	0	0	0	0	0	0	0	0	0	0
11	13	0	0	0	0	2,304	2,304	2,304	0	0	0	0	2,304	17	18	280	10	0	0	0	290	290	0	0	0	0	290
11	14	2	0	0	0	0	2	2	0	0	0	0	2	17	21	133	0	0	0	0	133	0	0	133	0	0	133
11	15	13	0	0	0	0	13	11	3	0	0	0	14	19	2	96	0	0	0	0	96	40	57	0	0	0	97
11	17	0	0	0	0	0	0	0	0	0	0	0	0	19	6	0	0	0	0	0	0	0	0	0	0	0	0
11	18	9	231	0	0	0	240	9	231	0	0	0	240	19	7	7	0	0	0	0	7	7	0	0	0	0	7
11	21	0	0	0	0	0	0	0	0	0	0	0	0	19	8	1	1	0	0	0	3	0	0	2	0	2	3
12	2	0	0	0	0	0	0	0	14	0	0	0	46	19	10	0	139	0	0	0	139	0	139	0	0	0	139
12	6	0	0	0	0	0	0	0	0	0	0	0	0	19	12	104	0	0	0	0	104	0	0	0	0	104	104
12	13	0	0	0	8	0	8	8	0	0	0	0	8	19	13	11	0	0	0	0	11	11	0	0	0	0	11
12	14	0	0	0	634	0	634	634	0	0	0	0	634	19	14	9	0	0	0	0	9	0	0	9	0	0	9
12	15	0	0	0	113	0	113	82	31	0	0	0	113	19	15	51	0	0	0	0	51	30	21	0	0	0	51
12	16	0	0	0	0	0	0	0	0	0	0	0	0	19	17	191	0	0	0	0	191	191	0	0	0	0	191
12	17	0	0	0	23	0	23	23	0	0	0	0	23	21	2	0	0	0	0	82	82	54	27	0	0	0	81
12	18	0	0	0	73	0	73	73	0	0	0	0	73	21	6	0	0	0	0	0	0	0	0	0	0	0	0
12	21	0	0	0	221	0	221	221	0	0	0	0	221	21	7	0	0	0	0	17	17	17	0	0	0	0	17
13	2	72	0	0	0	0	72	12	60	0	0	0	72	21	8	0	0	0	0	5,303	5,303	0	0	0	0	5,303	5,303
13	6	0	0	0	0	0	0	0	0	0	0	0	0	21	10	0	0	0	0	0	0	0	0	0	0	0	0
13	7	16	0	0	0	0	16	16	0	0	0	0	16	21	12	0	0	0	0	137	137	0	0	0	137	0	137
13	8	158	0	0	0	0	158	0	0	0	0	158	158	21	13	0	0	0	0	3	3	3	0	0	0	0	3
13	10	0	0	0	0	0	0	0	0	0	0	0	0	21	14	0	0	0	0	74	74	74	0	0	0	0	74
13	12	111	0	0	0	0	111	0	0	0	111	0	111	21	15	0	0	0	0	29	29	23	6	0	0	0	29
13	14	53	0	0	0	0	53	53	0	0	0	0	53	21	16	0	0	0	0	0	0	0	0	0	0	0	0
13	15	164	0	0	0	0	164	61	104	0	0	0	165	21	17	0	0	0	0	52	52	52	0	0	0	0	52

Table-A1-5. Weekday flows in 2020 (Source: Study Team)

From Ramp	To Ramp	Outbound										Inbound									
		by Walk	by Ordinary Bus	by MRT	by BRT	by elevated busway	by Bekasi-Serpong line	by Loop line	by Airport Express	Total		by Walk	by Ordinary Bus	by MRT	by BRT	by elevated busway	by Bekasi-Serpong line	by Loop line	by Airport Express	Total	
4	8	5,043	2,807	0	0	0	0	0	0	7,850		270	0	0	0	0	0	0	0	270	
4	9	1,004	894	0	0	0	0	0	0	1,898		2,032	0	0	0	0	0	0	0	2,032	
4	10	0	12	0	0	0	0	0	0	12		703	0	0	0	0	0	0	0	703	
4	12	2,054	938	0	0	0	0	0	0	2,992		66	0	0	0	0	0	0	0	66	
4	13	531	430	0	0	0	0	0	0	961		1,652	0	0	0	0	0	0	0	1,652	
4	14	3,717	73	0	0	0	0	0	0	3,790		1,089	0	0	0	0	0	0	0	1,089	
4	15	432	38,953	0	0	0	0	0	0	39,385		2,218	0	0	0	0	0	0	0	2,218	
4	17	732	1,069	0	0	0	0	0	0	1,801		40	0	0	0	0	0	0	0	40	
4	18	1,005	155	0	0	0	0	0	0	1,160		226	0	0	0	0	0	0	0	226	
4	20	766	60	0	0	0	0	0	0	826		35	0	0	0	0	0	0	0	35	
4	21	7,156	4,990	0	0	0	0	0	0	12,146		1,202	0	0	0	0	0	0	0	1,202	
5	8	1,861	0	0	0	0	0	0	0	1,861		1,573	0	0	0	0	0	0	0	1,573	
5	21	2,591	0	0	0	0	0	0	0	2,591		85,886	0	0	0	0	0	0	0	85,886	
6	7	0	0	4	0	0	0	0	0	4		1	0	0	0	0	0	0	0	1	
6	8	0	0	2,642	0	0	0	0	0	2,642		15,159	0	0	0	0	0	0	0	15,159	
6	9	0	0	5,847	0	0	0	0	0	5,847		2,045	0	0	0	0	0	0	0	2,045	
6	10	0	0	70	0	0	0	0	0	70		41	0	0	0	0	0	0	0	41	
6	12	0	0	3,740	0	0	0	0	0	3,740		32,147	0	0	0	0	0	0	0	32,147	
6	13	0	0	541	0	0	0	0	0	541		1,111	0	0	0	0	0	0	0	1,111	
6	14	0	0	90,339	0	0	0	0	0	90,339		2,115	0	0	0	0	0	0	0	2,115	
6	15	0	0	75	0	0	0	0	0	75		12	0	0	0	0	0	0	0	12	
6	17	0	0	1,150	0	0	0	0	0	1,150		110	0	0	0	0	0	0	0	110	
6	18	0	0	471	0	0	0	0	0	471		1,420	0	0	0	0	0	0	0	1,420	
6	20	0	0	1,507	0	0	0	0	0	1,507		49,960	0	0	0	0	0	0	0	49,960	
6	21	0	0	9,220	0	0	0	0	0	9,220		2,540	0	0	0	0	0	0	0	2,540	
8	2	0	0	0	0	0	10,005	0	0	10,005		309	0	0	0	0	0	0	0	309	
8	6	0	0	2,081	0	0	2,081	0	0	4,162		9,541	0	0	0	0	0	0	0	9,541	
8	9	0	0	4,258	0	0	4,258	0	0	8,516		771	0	0	0	0	0	0	0	771	
8	12	0	0	315	0	0	315	0	0	630		192	0	0	0	0	0	0	0	192	
8	13	0	0	1,993	0	0	1,993	0	0	3,986		2,386	0	0	0	0	0	0	0	2,386	
8	14	0	0	16,105	0	0	16,105	0	0	32,210		3,050	0	0	0	0	0	0	0	3,050	
8	15	0	0	6,224	0	0	6,224	0	0	12,448		1,245	0	0	0	0	0	0	0	1,245	
8	17	0	0	2,485	0	0	2,485	0	0	4,970		5,097	0	0	0	0	0	0	0	5,097	
8	20	0	0	922	0	0	922	0	0	1,844		116	0	0	0	0	0	0	0	116	
8	21	0	0	98,349	12,895	53,576	164,820	0	0	329,640		9,478	0	0	0	0	0	0	4,856	9,478	
9	2	0	0	0	0	0	2,292	0	0	2,292		1,146	0	0	0	0	0	0	0	1,146	
9	6	0	0	5,301	0	0	5,301	0	0	10,602		329	0	0	0	0	0	0	0	329	
9	8	0	0	2,724	0	0	2,724	0	0	5,448		110	0	0	0	0	0	0	0	110	
9	12	0	0	673	0	0	0	0	0	673		387	0	0	0	0	0	0	0	387	
9	13	0	0	1,766	0	0	0	0	0	1,766		983	0	0	0	0	0	0	0	983	
9	14	0	0	2,365	0	0	0	0	0	2,365		120	0	0	0	0	0	0	0	120	
9	15	0	0	7	0	0	0	0	0	7		276	0	0	0	0	0	0	0	276	
9	17	0	0	1,151	0	0	0	0	0	1,151		143	0	0	0	0	0	0	0	143	
9	20	0	0	6,691	0	0	0	0	0	6,691		370	0	0	0	0	0	0	0	370	
9	21	2	0	5,278	0	0	1,782	604	2,892	10,558		4,786	0	0	0	0	0	0	0	4,786	
11	2	0	0	0	0	0	0	0	0	2		872	0	0	0	0	0	0	872	872	
11	13	18	0	18	0	0	0	0	0	36		597	0	0	0	0	0	0	0	597	
11	14	5	0	0	0	0	0	0	0	5		1,143	0	0	0	0	0	0	0	1,143	
11	15	176	0	0	0	0	0	0	0	176		7,387	0	0	0	0	0	0	0	7,387	
11	17	14	0	0	0	0	0	0	0	14		587	0	0	0	0	0	0	0	587	
11	18	19	630	0	0	0	0	0	0	649		20	0	0	0	0	0	0	0	20	
12	2	0	0	0	5,543	0	5,543	0	0	11,086		529	0	0	0	0	0	0	0	529	
12	6	0	0	2,893	0	0	2,893	0	0	5,786		36	0	0	0	0	0	0	0	36	
12	8	0	0	730	0	0	730	0	0	1,460		722	0	0	0	0	0	0	0	722	
12	9	0	0	774	0	0	774	0	0	1,548		19,445	0	0	0	0	0	0	0	19,445	
12	12	0	0	6,196	0	0	6,196	0	0	12,392		7,961	0	0	0	0	0	0	0	7,961	
12	13	0	0	1,575	0	0	0	0	0	1,575		166,342	0	0	0	0	0	12,600	53,844	166,342	
12	14	0	0	38,161	0	0	0	0	0	38,161		5,296	0	0	0	0	0	0	0	5,296	
12	15	0	0	10	0	0	0	0	0	10		4,531	0	0	0	0	0	0	0	4,531	
12	17	0	0	2,721	0	0	0	0	0	2,721		1,262	0	0	0	0	0	0	0	1,262	
12	18	0	0	270	0	0	0	0	0	270		2,321	0	0	0	0	0	0	0	2,321	
12	20	0	0	608	0	0	0	0	0	608		5,064	0	0	0	0	0	0	0	5,064	
12	21	0	0	5,433	0	0	3,254	226	1,953	10,866		2,396	0	0	0	0	0	0	0	2,396	
13	2	838	0	0	0	0	0	0	0	838		1,057	0	0	0	0	0	0	1,057	1,894	
13	6	518	0	0	0	0	0	0	0	518		1,894	0	0	0	0	0	0	0	1,894	

Table-A1-6. Peak morning flows in 2020 (Source: Study Team)

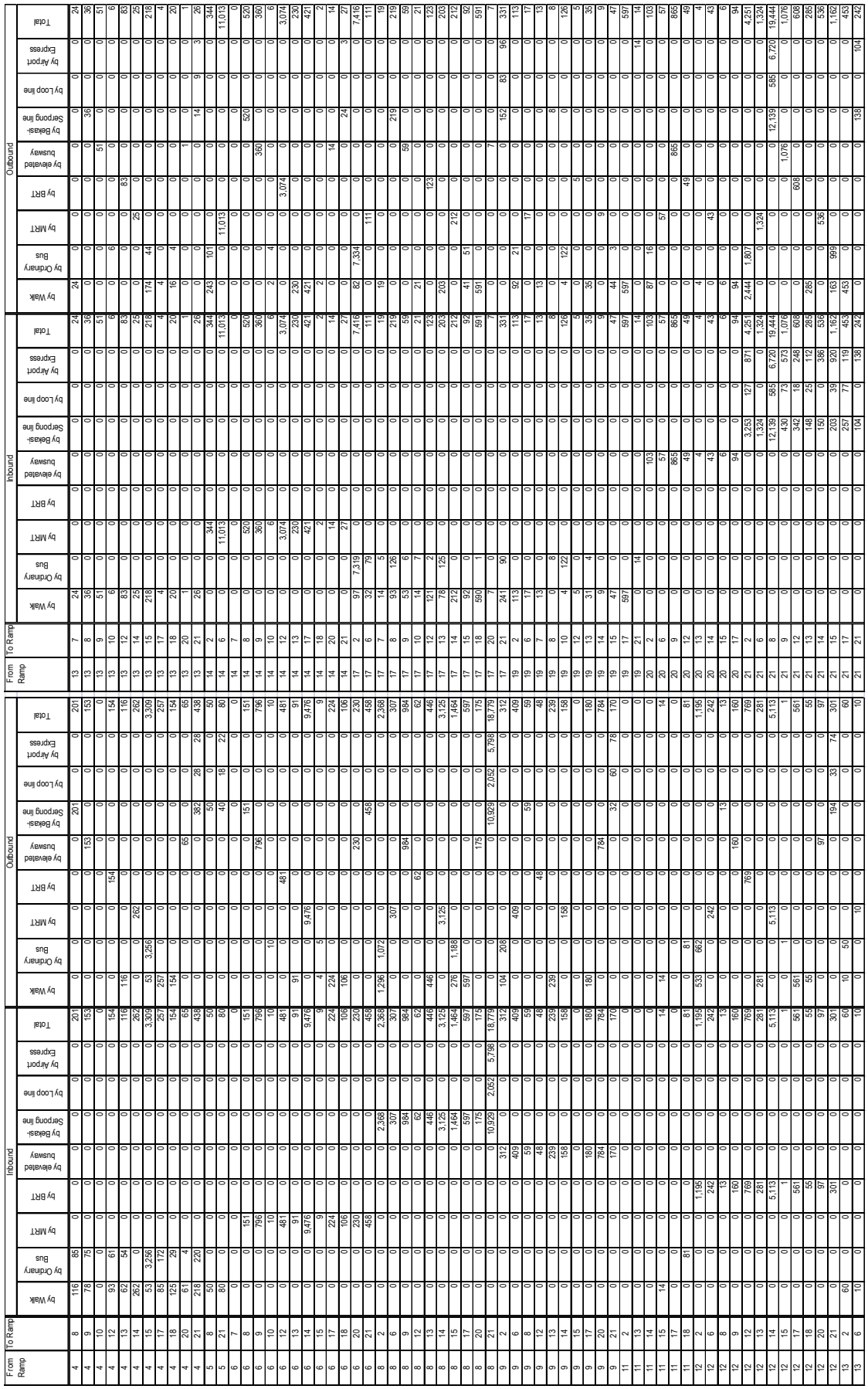


Table-A1-7. Peak afternoon flows in 2020 (Source: Study Team)

From Ramp	To Ramp	Inbound										Outbound									
		by Walk	by Ordinary Bus	by MRT	by BRT	by elevated busway	by Bekasi-Cerpong line	by Loop line	by Airport Express	Total		by Walk	by Ordinary Bus	by MRT	by BRT	by elevated busway	by Bekasi-Cerpong line	by Loop line	by Airport Express	Total	
4	8	1,013	536	0	0	0	0	0	0	1,549		0	0	0	0	0	1,549	0	0	1,549	
4	9	129	81	0	0	0	0	0	0	210		0	0	0	0	210	0	0	0	210	
4	10	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
4	12	372	155	0	0	0	0	0	0	527		0	0	0	527	0	0	0	0	527	
4	13	32	26	0	0	0	0	0	0	58		58	0	0	0	0	0	0	0	58	
4	14	500	14	0	0	0	0	0	0	514		0	0	514	0	0	0	0	0	514	
4	15	17	5,003	0	0	0	0	0	0	5,020		17	5,003	0	0	0	0	0	0	5,020	
4	17	38	69	0	0	0	0	0	0	107		107	0	0	0	0	0	0	0	107	
4	18	56	8	0	0	0	0	0	0	64		64	0	0	0	0	0	0	0	64	
4	20	123	10	0	0	0	0	0	0	133		0	0	0	0	133	0	0	0	133	
4	21	1,412	885	0	0	0	0	0	0	2,297		0	0	0	0	0	1,821	46	430	2,297	
5	8	409	0	0	0	0	0	0	0	409		409	0	0	0	0	0	0	0	409	
5	21	550	0	0	0	0	0	0	0	550		0	0	0	0	0	333	30	187	550	
6	7	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
6	8	0	0	393	0	0	0	0	0	393		0	0	393	0	0	393	0	0	393	
6	9	0	0	404	0	0	0	0	0	404		0	0	404	0	0	0	0	0	404	
6	10	0	0	6	0	0	0	0	0	6		6	0	0	0	0	0	0	0	6	
6	12	0	0	301	0	0	0	0	0	301		0	0	0	301	0	0	0	0	301	
6	13	0	0	7	0	0	0	0	0	7		7	0	0	0	0	0	0	0	7	
6	14	0	0	9,883	0	0	0	0	0	9,883		0	0	9,883	0	0	0	0	0	9,883	
6	15	0	0	5	0	0	0	0	0	5		5	0	5	0	0	0	0	0	5	
6	17	0	0	39	0	0	0	0	0	39		39	0	0	0	0	0	0	0	39	
6	18	0	0	12	0	0	0	0	0	12		12	0	0	0	0	0	0	0	12	
6	20	0	0	64	0	0	0	0	0	64		0	0	64	0	0	0	0	0	64	
6	21	0	0	1,383	0	0	0	0	0	1,383		0	0	0	0	0	1,383	0	0	1,383	
8	2	0	0	0	0	0	153	0	0	153		74	79	0	0	0	0	0	0	153	
8	6	0	0	0	0	0	130	0	0	130		0	0	130	0	0	0	0	0	130	
8	9	0	0	0	0	0	86	0	0	86		86	0	0	0	0	0	0	0	86	
8	12	0	0	0	0	0	1	0	0	1		0	0	1	0	0	0	0	0	1	
8	13	0	0	0	0	0	14	0	0	14		14	0	0	0	0	0	0	0	14	
8	14	0	0	0	0	0	571	0	0	571		0	0	571	0	0	0	0	0	571	
8	15	0	0	0	0	0	135	0	0	135		13	122	0	0	0	0	0	0	135	
8	17	0	0	0	0	0	30	0	0	30		30	0	0	0	0	0	0	0	30	
8	20	0	0	0	0	0	37	0	0	37		0	0	0	0	37	0	0	0	37	
8	21	0	0	0	0	0	10,073	585	5,207	15,865		0	0	0	0	0	10,073	585	5,207	15,865	
9	2	0	0	0	0	0	154	0	0	154		35	119	0	0	0	0	0	0	154	
9	6	0	0	0	0	0	661	0	0	661		0	0	661	0	0	0	0	0	661	
9	8	0	0	0	0	0	485	0	0	485		0	0	0	0	0	485	0	0	485	
9	12	0	0	0	0	0	113	0	0	113		0	0	0	113	0	0	0	0	113	
9	13	0	0	0	0	0	88	0	0	88		88	0	0	0	0	0	0	0	88	
9	14	0	0	0	0	0	340	0	0	340		0	0	340	0	0	0	0	0	340	
9	15	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
9	17	0	0	0	0	0	63	0	0	63		63	0	0	0	0	0	0	0	63	
9	20	0	0	0	0	0	578	0	0	578		0	0	578	0	0	0	0	0	578	
9	21	0	0	0	0	0	896	0	0	896		0	0	0	0	0	355	69	472	896	
11	2	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
11	13	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
11	14	1	0	0	0	0	1	0	0	1		0	0	1	0	0	0	0	0	1	
11	15	12	0	0	0	0	12	0	0	12		10	2	0	0	0	0	0	0	12	
11	17	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
11	18	1	44	0	0	0	45	0	0	45		1	44	0	0	0	0	0	0	45	
12	2	0	0	0	0	0	168	0	0	168		81	87	0	0	0	0	0	0	168	
12	6	0	0	0	0	0	334	0	0	334		0	0	334	0	0	0	0	0	334	
12	8	0	0	0	0	0	106	0	0	106		0	0	0	0	0	106	0	0	106	
12	9	0	0	0	0	0	38	0	0	38		0	0	0	0	38	0	0	0	38	
12	12	0	0	0	0	0	412	0	0	412		0	0	0	412	0	0	0	0	412	
12	13	0	0	0	0	0	43	0	0	43		43	0	0	0	0	0	0	0	43	
12	14	0	0	0	0	0	2,809	0	0	2,809		0	0	2,809	0	0	0	0	0	2,809	
12	15	0	0	0	0	0	2	0	0	2		0	2	0	0	0	0	0	0	2	
12	17	0	0	0	0	0	82	0	0	82		82	0	0	0	0	0	0	0	82	
12	18	0	0	0	0	0	13	0	0	13		13	0	0	0	0	0	0	0	13	
12	20	0	0	0	0	0	39	0	0	39		0	0	0	0	0	39	0	0	39	
12	21	0	0	0	0	0	585	0	0	585		0	0	0	0	0	384	4	197	585	
13	2	82	0	0	0	0	0	0	0	82		82	0	0	0	0	0	0	0	82	
13	6	66	0	0	0	0	0	0	0	66		0	0	66	0	0	0	0	0	66	
13	8	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
13	9	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
13	12	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
13	13	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
13	15	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
13	17	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
13	18	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
13	20	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	
13	21	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	

Table-A1-8. Weekday flows in 2030 (Source: Study Team)

From RAMP	To RAMP	Inbound											Outbound										
		by Walk	by Ordinary Buses	by MRT	by BRT	by elevated busway	by Bekasi-Serpong line	by Loop line	by Airport Express (Tangerang)	by Airport Express (Harbor)	Total		by Walk	by Ordinary Buses	by MRT	by BRT	by elevated busway	by Bekasi-Serpong line	by Loop line	by Airport Express (Tangerang)	by Airport Express (Harbor)	Total
4	8	3,397	10,333	0	0	0	0	0	0	0	13,730	12	21	0	0	0	12,988	732	0	0	13,730	12	21
4	9	473	2,318	0	0	0	0	0	0	0	2,791	13	2	733	0	0	0	0	0	0	2,791	13	2
4	10	0	41	0	0	0	0	0	0	0	41	13	6	1,032	0	0	0	0	0	0	41	13	6
4	12	1,005	3,405	0	0	0	0	0	0	0	4,411	13	8	2,447	0	0	4,411	0	0	0	4,411	13	8
4	13	410	510	0	0	0	0	0	0	0	920	13	9	873	0	0	0	0	0	0	920	13	9
4	14	1,244	174	0	0	0	0	0	0	0	1,378	13	10	120	0	0	1,378	0	0	0	1,378	13	10
4	15	206	37,517	0	0	0	0	0	0	0	37,723	13	12	1,493	0	0	0	0	0	0	37,723	13	12
4	17	506	1,188	0	0	0	0	0	0	0	1,694	13	14	744	0	0	0	0	0	0	1,694	13	14
4	18	606	111	0	0	0	0	0	0	0	717	13	15	2,123	0	0	0	0	0	0	717	13	15
4	20	343	220	0	0	0	0	0	0	0	563	13	17	26	0	0	0	0	0	0	563	13	17
4	21	4,376	10,700	0	0	0	0	0	0	0	15,076	13	18	173	0	0	14,296	272	260	248	15,076	13	18
5	8	1,484	0	0	0	0	0	0	0	0	1,484	13	20	40	0	0	1,447	37	0	0	1,484	13	20
5	9	77	0	0	0	0	0	0	0	0	77	13	21	1,596	0	0	77	0	0	0	77	13	21
5	20	51	0	0	0	0	0	0	0	0	51	14	2	0	0	0	51	0	0	0	51	14	2
5	21	1,930	0	0	0	0	0	0	0	0	1,930	14	6	0	0	0	1,930	156	156	156	1,930	14	6
6	8	0	0	0	0	0	0	0	0	0	12,324	14	8	0	0	0	12,324	0	0	0	12,324	14	8
6	9	0	0	0	0	0	0	0	0	0	15,124	14	9	0	0	0	15,124	0	0	0	15,124	14	9
6	10	0	0	0	0	0	0	0	0	0	332	14	10	0	0	0	1	331	0	0	332	14	10
6	12	0	0	0	0	0	0	0	0	0	9,810	14	12	0	0	0	0	0	9,810	0	9,810	14	12
6	13	0	0	0	0	0	0	0	0	0	1,178	14	13	0	0	0	0	1,178	0	0	1,178	14	13
6	14	0	0	0	0	0	0	0	0	0	149,497	14	17	0	0	0	0	149,497	0	0	149,497	14	17
6	15	0	0	0	0	0	0	0	0	0	33	14	18	0	0	0	0	33	0	0	33	14	18
6	17	0	0	0	0	0	0	0	0	0	2,137	14	20	0	0	0	0	2,137	0	0	2,137	14	20
6	18	0	0	0	0	0	0	0	0	0	591	14	21	0	0	0	0	591	0	0	591	14	21
6	20	0	0	0	0	0	0	0	0	0	2,882	17	2	715	39,883	0	0	2,882	0	0	2,882	17	2
6	21	0	0	0	0	0	0	0	0	0	21,018	17	6	1,774	7,668	0	0	21,018	0	0	21,018	17	6
8	2	0	0	0	0	0	0	0	0	0	15,673	17	8	5,070	8,033	0	0	0	0	0	15,673	17	8
8	6	0	0	0	0	0	0	0	0	0	11,022	17	9	903	72	0	0	0	0	0	11,022	17	9
8	9	0	0	0	0	0	0	0	0	0	11,083	17	10	120	61	0	0	11,083	0	0	11,083	17	10
8	12	0	0	0	0	0	0	0	0	0	4,395	17	12	1,776	0	0	0	4,395	0	0	4,395	17	12
8	13	0	0	0	0	0	0	0	0	0	2,261	17	13	632	528	0	0	0	0	0	2,261	17	13
8	14	0	0	0	0	0	0	0	0	0	30,918	17	14	2,356	0	0	0	30,918	0	0	30,918	17	14
8	15	0	0	0	0	0	0	0	0	0	9,700	17	15	1,149	0	0	0	0	0	0	9,700	17	15
8	17	0	0	0	0	0	0	0	0	0	3,578	17	18	4,173	69	0	0	0	0	0	3,578	17	18
8	20	0	0	0	0	0	0	0	0	0	1,575	17	20	133	0	0	0	1,575	0	0	1,575	17	20
8	21	0	0	0	0	0	0	0	0	0	202,577	17	21	4,718	4,585	0	0	0	122,563	37,314	38,700	3,000	202,577
9	2	0	0	0	0	0	0	0	0	0	2,070	19	2	930	0	0	0	0	0	0	0	0	2,070
9	6	0	0	0	0	0	0	0	0	0	13,157	19	6	399	0	0	0	0	0	0	13,157	0	0
9	8	0	0	0	0	0	0	0	0	0	6,666	19	8	0	571	0	0	6,396	270	0	0	0	6,666
9	12	0	0	0	0	0	0	0	0	0	1,031	19	12	0	0	0	1,031	0	0	0	0	0	1,031
9	13	0	0	0	0	0	0	0	0	0	1,688	19	13	141	56	0	0	0	0	0	1,688	0	0
9	14	0	0	0	0	0	0	0	0	0	2,635	19	14	160	0	0	0	2,635	0	0	0	0	2,635
9	15	0	0	0	0	9	0	0	0	0	9	19	15	294	0	0	0	0	0	0	0	0	9
9	17	0	0	0	0	0	0	0	0	0	1,051	19	17	3,938	6	0	0	0	0	0	1,051	0	0
9	20	0	0	0	0	0	0	0	0	0	7,148	19	20	0	6	0	0	7,148	0	0	7,148	0	0
9	21	0	0	0	0	0	0	0	0	0	7,641	19	21	0	6	0	0	0	4,967	933	1,555	186	7,641
11	2	2	0	0	0	0	0	0	0	0	2	20	2	0	0	0	0	0	0	0	0	0	2
11	13	16	0	0	0	0	0	0	0	0	16	20	6	0	0	0	0	0	0	0	16	0	0
11	14	144	0	0	0	0	0	0	0	0	14	20	9	0	0	0	0	14	0	0	0	0	14
11	15	151	0	0	0	0	0	0	0	0	151	20	12	0	0	0	0	123	28	0	0	0	151
11	17	10	0	0	0	0	0	0	0	0	10	20	13	0	0	0	0	10	0	0	0	0	10
11	18	10	725	0	0	0	0	0	0	0	735	20	14	0	0	0	0	10	725	0	0	0	735
12	2	0	0	0	5,493	0	0	0	0	0	5,493	20	17	0	0	0	0	0	1,292	4,201	0	0	5,493
12	6	0	0	0	7,920	0	0	0	0	0	7,920	21	2	0	0	0	0	0	0	0	7,920	0	0
12	8	0	0	0	4,162	0	0	0	0	0	4,162	21	6	0	0	0	0	0	3,931	231	0	0	4,162
12	9	0	0	0	1,419	0	0	0	0	0	1,419	21	8	0	0	0	1,419	0	0	0	0	0	1,419
12	12	0	0	0	5,941	0	0	0	0	0	5,941	21	9	0	0	0	5,941	0	0	0	0	0	5,941
12	13	0	0	0	1,565	0	0	0	0	0	1,565	21	12	0	0	0	0	1,565	0	0	0	0	1,565
12	14	0	0	0	29,804	0	0	0	0	0	29,804	21	13	0	0	0	0	29,804	0	0	0	0	29,804
12	15	0	0	0	7	0	0	0	0	0	7	21	14	0	0	0	0	0	0	0	7	0	0
12	17	0	0	0	2,003	0	0	0	0	0	2,003	21	15	0	0	0	0	2,003	0	0	0	0	2,003
12	18	0	0	0	114	0	0	0	0	0	114	21	17	0	0	0	0	114	0	0	0	0	114
12	20	0	0	0	544	0	0	0	0	0	544	21	21	0	0	0	0	544	0	0	0	0	544

Table-1-9. Peak morning flows in 2030 (Source: Study Team)

From RAMP	To RAMP	Inbound for Dukuh Atas										Outbound for Dukuh Atas									
		by Walk	by Ordinary Buses	by MRT	by BRT	by elevated busway	by Bekasi-Serpong line	by Loop line	by Airport Express (Tangerang)	by Airport Express (Harbor)	Total	by Walk	by Ordinary Buses	by MRT	by BRT	by elevated busway	by Bekasi-Serpong line	by Loop line	by Airport Express (Tangerang)	by Airport Express (Harbor)	Total
4	8	50	350	0	0	0	0	0	0	0	400	0	0	0	0	0	358	42	0	0	400
4	9	26	188	0	0	0	0	0	0	0	214	0	0	0	0	214	0	0	0	0	214
4	10	0	2	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	2
4	12	50	179	0	0	0	0	0	0	0	229	0	0	0	229	0	0	0	0	0	229
4	13	42	67	0	0	0	0	0	0	0	109	109	0	0	0	0	0	0	0	0	109
4	14	116	15	0	0	0	0	0	0	0	131	0	0	131	0	0	0	0	0	0	131
4	15	24	3,459	0	0	0	0	0	0	0	3,483	24	3,459	0	0	0	0	0	0	0	3,483
4	17	55	165	0	0	0	0	0	0	0	220	220	0	0	0	0	0	0	0	0	220
4	18	74	25	0	0	0	0	0	0	0	99	99	0	0	0	0	0	0	0	0	99
4	20	26	18	0	0	0	0	0	0	0	44	0	0	0	0	44	0	0	0	0	44
4	21	145	420	0	0	0	0	0	0	20	585	0	0	0	0	0	524	25	15	21	585
5	8	38	0	0	0	0	0	0	0	0	38	0	0	0	0	0	36	2	0	0	38
5	9	6	0	0	0	0	0	0	0	0	6	0	0	0	0	6	0	0	0	0	6
5	20	4	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	4
5	21	74	0	0	0	0	0	0	0	1	75	0	0	0	0	0	49	14	11	1	75
6	8	0	0	1,394	0	0	0	0	0	0	1,394	0	0	0	0	0	1,394	0	0	0	1,394
6	9	0	0	2,665	0	0	0	0	0	0	2,665	0	0	0	0	2,665	0	0	0	0	2,665
6	10	0	0	74	0	0	0	0	0	0	74	0	74	0	0	0	0	0	0	0	74
6	12	0	0	1,763	0	0	0	0	0	0	1,763	0	0	0	1,763	0	0	0	0	0	1,763
6	13	0	0	258	0	0	0	0	0	0	258	258	0	0	0	0	0	0	0	0	258
6	14	0	0	19,820	0	0	0	0	0	0	19,820	0	0	19,820	0	0	0	0	0	0	19,820
6	15	0	0	4	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	4
6	17	0	0	472	0	0	0	0	0	0	472	472	0	0	0	0	0	0	0	0	472
6	18	0	0	142	0	0	0	0	0	0	142	142	0	0	0	0	0	0	0	0	142
6	20	0	0	519	0	0	0	0	0	0	519	0	0	0	0	519	0	0	0	0	519
6	21	0	0	1,855	0	0	0	0	0	0	1,855	0	0	0	0	0	1,855	0	0	0	1,855
8	2	0	0	0	0	0	3,382	290	0	0	3,672	1,145	2,527	0	0	0	0	0	0	0	3,672
8	6	0	0	0	0	0	1,315	0	0	0	1,315	0	0	1,315	0	0	0	0	0	0	1,315
8	9	0	0	0	0	0	2,311	127	0	0	2,438	0	0	0	0	2,438	0	0	0	0	2,438
8	12	0	0	0	0	0	892	30	0	0	922	0	0	0	922	0	0	0	0	0	922
8	13	0	0	0	0	0	484	20	0	0	504	504	0	0	0	0	0	0	0	0	504
8	14	0	0	0	0	0	6,242	124	0	0	6,366	0	0	6,366	0	0	0	0	0	0	6,366
8	15	0	0	0	0	0	2,209	31	0	0	2,240	196	2,044	0	0	0	0	0	0	0	2,240
8	17	0	0	0	0	0	822	12	0	0	834	834	0	0	0	0	0	0	0	0	834
8	20	0	0	0	0	0	300	0	0	0	300	0	0	0	0	300	0	0	0	0	300
8	21	0	0	0	0	0	13,147	4,760	4,701	412	23,020	0	0	0	0	0	13,147	4,760	4,701	412	23,020
9	2	0	0	0	0	313	0	0	0	0	313	70	243	0	0	0	0	0	0	0	313
9	6	0	0	0	0	719	0	0	0	0	719	0	0	719	0	0	0	0	0	0	719
9	8	0	0	0	0	210	0	0	0	0	210	0	0	0	0	0	194	16	0	0	210
9	12	0	0	0	0	109	0	0	0	0	109	0	0	0	109	0	0	0	0	0	109
9	13	0	0	0	0	221	0	0	0	0	221	221	0	0	0	0	0	0	0	0	221
9	14	0	0	0	0	228	0	0	0	0	228	0	0	228	0	0	0	0	0	0	228
9	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	17	0	0	0	0	176	0	0	0	0	176	176	0	0	0	0	0	0	0	0	176
9	20	0	0	0	0	858	0	0	0	0	858	0	0	0	0	858	0	0	0	0	858
9	21	0	0	0	0	225	0	0	0	15	240	0	0	0	0	0	86	77	61	16	240
11	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	15	10	0	0	0	0	0	0	0	0	10	10	0	0	0	0	0	0	0	0	10
11	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	18	0	83	0	0	0	0	0	0	0	83	0	83	0	0	0	0	0	0	0	83
12	2	0	0	0	1,173	0	0	0	0	0	1,173	262	911	0	0	0	0	0	0	0	1,173
12	6	0	0	0	495	0	0	0	0	0	495	0	0	495	0	0	0	0	0	0	495
12	8	0	0	0	134	0	0	0	0	0	134	0	0	0	0	0	117	17	0	0	134
12	9	0	0	0	244	0	0	0	0	0	244	0	0	0	0	244	0	0	0	0	244
12	12	0	0	0	682	0	0	0	0	0	682	0	0	0	682	0	0	0	0	0	682
12	13	0	0	0	267	0	0	0	0	0	267	267	0	0	0	0	0	0	0	0	267
12	14	0	0	0	3,971	0	0	0	0	0	3,971	0	0	3,971	0	0	0	0	0	0	3,971
12	15	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1
12	17	0	0	0	412	0	0	0	0	0	412	412	0	0	0	0	0	0	0	0	412
12	18	0	0	0	26	0	0	0	0	0	26	26	0	0	0	0	0	0	0	0	26
12	20	0	0	0	63	0	0	0	0	0	63	0	0	0	0	63	0	0	0	0	63
12	21	0	0	0	529	0	0	0	0	6	535	0	0	0	0	0	393	75	61	6	535
13	2	46	0	0	0	0	0	0	0	0	46	12	34	0	0	0	0	0	0	0	46
13	6	26	0	0	0	0	0	0	0	0	26	0	0	26	0	0	0	0	0	0	26
13	8	74	0	0	0	0	0	0	0	0	74	0	0	0	0	0	70	4	0	0	74
13	9	75	0	0	0	0	0	0	0	0	75	0	0	0	0	75	0	0	0	0	75
13	10	14	0	0	0	0	0	0	0	0	14	0	14	0	0	0	0	0	0	0	14
13	12	101	0	0	0	0	0	0	0	0	101	0	0	0	101	0	0	0	0	0	101
13	14	28	0	0	0	0	0	0	0	0	28	0	0	28	0	0	0	0	0	0	28
13	15	214	0	0	0	0	0	0	0	0	214	178	36	0	0	0	0	0	0	0	214
13	17	2	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	2
13	18	16	0	0	0	0	0	0	0	0	16	10	6	0	0	0	0	0	0	0	16
13	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	21	30	0	0	0	0	0	0	0	0	30	0	0	0	0	0	18	7	5	0	30
14	2	0	0	116	0	0	0	0	0	0	116	84	32	0	0	0	0	0	0	0	116
14	6	0	0	15,303	0	0	0	0	0	0	15,303	0	0	15,303	0	0	0	0	0	0	15,303
14	8	0	0	1,257	0	0	0	0	0	0	1,257	0	0	0	0	0	1,235	22	0	0	1,257
14	9	0	0	344	0	0	0	0	0	0	344	0	0	0	0	344	0	0	0	0	344
14	10	0	0	15	0	0	0	0	0	0	15	2	13	0	0	0	0	0	0	0	15
14	12	0	0	2,940	0	0	0	0	0	0	2,940	0	0	0	2,940	0	0	0	0	0	2,940
14	13	0	0	146	0	0	0	0	0	0	146	146	0	0	0	0	0	0	0	0	146
14	17	0	0	342	0	0	0	0	0	0	342	342	0	0	0	0	0	0	0	0	342
14	18	0	0	15	0	0	0	0	0	0	15	15	0	0	0	0	0	0	0	0	15
14	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	21	0	0	230	0	0	0	0	0	2	232	0	0	0	0	0	230	0	0	2	232
17	2	75	5,459	0	0	0	0	0	0	0	5,534	62	5,472	0	0	0	0	0	0	0	5,534
17	6	78	224	0	0	0	0	0	0	0	302	0	0	302	0	0	0	0	0	0	302
17	8	151	200	0	0	0	0	0	0	0	351	0	0	0	0	0	319	32	0	0	351
17	9	59	6	0	0	0	0	0	0	0	65	0	0	0	0	65	0	0	0	0	65
17	10	10	8	0	0	0	0	0	0	0	18	18	0	0	0	0	0	0	0	0	18
17	12	87	0	0	0	0	0	0	0	0	87	0	0	0	87	0	0	0	0	0	87
17	13	76	81	0	0	0	0	0	0	0	157	157	0	0	0	0	0	0	0	0	157
17	14	176	0	0	0	0	0	0	0	0	176	0	0	176	0	0	0	0	0	0	176
17	15	86	0	0	0	0	0	0	0	0	86	33	53	0	0	0	0	0	0	0	86
17	18	490	11	0	0	0	0	0	0	0	501	499	2	0	0	0	0	0	0	0	501
17	20	8	0	0	0	0	0	0	0	0	8	0	0	0	0	8	0	0	0	0	8
17	21	280	143	0	0	0	0	0	0	13	436	0	0	0	0	0	314	63	45	13	435
19	2	84	0	0	0	0	0	0	0	0	84	68	16	0	0	0	0	0	0	0	84
19	6	13	0	0	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	0	13
19	8	0	14	0	0	0	0	0	0	0	14	0	0	0	0	0	13	1	0	0	14
19	10	2	207	0	0	0	0	0	0	0	209	2	207	0	0	0	0	0	0	0	209
19	12	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
19	13	19	6	0	0	0	0	0	0	0	25	25	0	0	0	0	0	0	0	0	25
19	14	10	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	10
19	15	32	0	0	0	0	0	0	0	0	32	30	2	0	0	0	0	0	0	0	32
19	17	482	1	0	0	0	0	0	0	0	483	483	0	0	0	0	0	0	0	0	483
19	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	2	0	0	0	0	72	0	0	0	0	72	46	26	0	0	0	0	0	0	0	72
20	6	0	0	0	0	155	0	0	0	0	155	0	0	155	0	0	0	0	0	0	155
20	9	0	0	0	0	968	0	0	0	0	968	0	0	0	0	968	0	0	0	0	968
20	12	0	0	0	0	73	0	0	0	0	73	0	0	0	73	0	0	0	0	0	73
20	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	17	0	0	0	0	18	0	0	0	0	18	18	0	0	0	0	0	0	0	0	18
21	2	0	0	0	0	0	3,977	109	117	0	4,203	1,627	2,576	0	0	0	0	0	0	0	4,203
21	6	0	0	0	0	0	2,992	0	0	0	2,992	0	0	2,992	0	0	0	0	0	0	2,992
21	8	0	0	0	0	0	17,134	3,125	4,916	404	25,579	0	0	0	0	0	17,134	3,125	4,916	404	25,579
21	9	0	0	0	0	0	1,078	68	213	0	1,359	0	0	0	0	1,359	0	0	0	0	1,359
21	12	0	0	0	0	0	912	35	111	0	1,058	0	0	0	1,057	0	0	0	0	0	1,057
21	13	0	0	0	0	0	288	33	36	0	357	357	0	0	0	0	0	0	0	0	357
21	14	0	0	0	0	0	387	4	2	0	393	0	0	393	0	0	0	0	0	0	393
21	15	0	0	0	0	0	760	30	145	0	935	75	860	0	0	0	0	0	0	0	935
21	17	0	0	0	0	0	601	97	71	0	769	769	0	0	0	0	0	0	0	0	769
21	21	0	0	0	0	0	117	0	269	14	400	0	0	0	0	0	284	0	102	14	400

Table-A1-10. Peak afternoon flows in 2030 (Source: Study Team)

From RAMP	To RAMP	Inbound										Outbound									
		by Walk	by Ordinary Buses	by MRT	by BRT	by elevated busway	by Bekasi-Serpong line	by Loop line	by Airport Express (Tangerang)	by Airport Express (Harbor)	Total	by Walk	by Ordinary Buses	by MRT	by BRT	by elevated busway	by Bekasi-Serpong line	by Loop line	by Airport Express (Tangerang)	by Airport Express (Harbor)	Total
4	8	677	2,132	0	0	0	0	0	0	0	2,809	0	0	0	0	0	2,670	139	0	0	2,809
4	9	55	266	0	0	0	0	0	0	0	321	0	0	0	0	321	0	0	0	0	321
4	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	12	163	650	0	0	0	0	0	0	0	813	0	0	0	813	0	0	0	0	0	813
4	13	24	26	0	0	0	0	0	0	0	50	50	0	0	0	0	0	0	0	0	50
4	14	129	23	0	0	0	0	0	0	0	152	0	0	152	0	0	0	0	0	0	152
4	15	10	4,326	0	0	0	0	0	0	0	4,336	10	4,326	0	0	0	0	0	0	0	4,336
4	17	26	77	0	0	0	0	0	0	0	103	103	0	0	0	0	0	0	0	0	103
4	18	34	5	0	0	0	0	0	0	0	39	39	0	0	0	0	0	0	0	0	39
4	20	54	32	0	0	0	0	0	0	0	86	0	0	0	0	86	0	0	0	0	86
4	21	861	1,934	0	0	0	0	0	0	0	2,795	0	0	0	0	0	2,678	38	45	34	2,795
5	8	339	0	0	0	0	0	0	0	0	339	0	0	0	0	0	332	7	0	0	339
5	9	10	0	0	0	0	0	0	0	0	10	0	0	0	0	10	0	0	0	0	10
5	20	8	0	0	0	0	0	0	0	0	8	0	0	0	0	8	0	0	0	0	8
5	21	405	0	0	0	0	0	0	0	0	405	0	0	0	0	0	354	23	26	2	405
6	8	0	0	1,122	0	0	0	0	0	0	1,122	0	0	0	0	0	1,122	0	0	0	1,122
6	9	0	0	789	0	0	0	0	0	0	789	0	0	0	0	789	0	0	0	0	789
6	10	0	0	11	0	0	0	0	0	0	11	0	11	0	0	0	0	0	0	0	11
6	12	0	0	503	0	0	0	0	0	0	503	0	0	0	503	0	0	0	0	0	503
6	13	0	0	27	0	0	0	0	0	0	27	27	0	0	0	0	0	0	0	0	27
6	14	0	0	13,714	0	0	0	0	0	0	13,714	0	0	13,714	0	0	0	0	0	0	13,714
6	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	17	0	0	80	0	0	0	0	0	0	80	80	0	0	0	0	0	0	0	0	80
6	18	0	0	11	0	0	0	0	0	0	11	11	0	0	0	0	0	0	0	0	11
6	20	0	0	151	0	0	0	0	0	0	151	0	0	0	0	151	0	0	0	0	151
6	21	0	0	2,856	0	0	0	0	0	0	2,856	0	0	0	0	0	2,856	0	0	0	2,856
8	2	0	0	0	0	0	318	46	0	0	364	100	264	0	0	0	0	0	0	0	364
8	6	0	0	0	0	0	852	0	0	0	852	0	0	852	0	0	0	0	0	0	852
8	9	0	0	0	0	0	300	27	0	0	327	0	0	0	0	327	0	0	0	0	327
8	12	0	0	0	0	0	117	7	0	0	124	0	0	0	124	0	0	0	0	0	124
8	13	0	0	0	0	0	23	0	0	0	23	23	0	0	0	0	0	0	0	0	23
8	14	0	0	0	0	0	1,144	25	0	0	1,169	0	0	1,169	0	0	0	0	0	0	1,169
8	15	0	0	0	0	0	258	2	0	0	260	9	251	0	0	0	0	0	0	0	260
8	17	0	0	0	0	0	70	4	0	0	74	74	0	0	0	0	0	0	0	0	74
8	20	0	0	0	0	0	66	0	0	0	66	0	0	0	0	66	0	0	0	0	66
8	21	0	0	0	0	0	13,181	3,355	3,574	170	20,280	0	0	0	0	0	13,181	3,355	3,574	170	20,280
9	2	0	0	0	0	104	0	0	0	0	104	19	85	0	0	0	0	0	0	0	104
9	6	0	0	0	0	2,010	0	0	0	0	2,010	0	0	2,010	0	0	0	0	0	0	2,010
9	8	0	0	0	0	1,221	0	0	0	0	1,221	0	0	0	0	0	1,186	35	0	0	1,221
9	12	0	0	0	0	142	0	0	0	0	142	0	0	0	142	0	0	0	0	0	142
9	13	0	0	0	0	88	0	0	0	0	88	88	0	0	0	0	0	0	0	0	88
9	14	0	0	0	0	365	0	0	0	0	365	0	0	365	0	0	0	0	0	0	365
9	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	17	0	0	0	0	60	0	0	0	0	60	60	0	0	0	0	0	0	0	0	60
9	20	0	0	0	0	671	0	0	0	0	671	0	0	0	0	671	0	0	0	0	671
9	21	0	0	0	0	1,378	0	0	0	0	1,378	0	0	0	0	0	992	113	255	18	1,378
11	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	14	3	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	3
11	15	8	0	0	0	0	0	0	0	0	8	7	1	0	0	0	0	0	0	0	8
11	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	18	0	60	0	0	0	0	0	0	0	60	0	60	0	0	0	0	0	0	0	60
12	2	0	0	0	189	0	0	0	0	0	189	33	156	0	0	0	0	0	0	0	189
12	6	0	0	0	1,132	0	0	0	0	0	1,132	0	0	1,132	0	0	0	0	0	0	1,132
12	8	0	0	0	757	0	0	0	0	0	757	0	0	0	0	0	726	31	0	0	757
12	9	0	0	0	100	0	0	0	0	0	100	0	0	0	0	100	0	0	0	0	100
12	12	0	0	0	452	0	0	0	0	0	452	0	0	0	452	0	0	0	0	0	452
12	13	0	0	0	62	0	0	0	0	0	62	62	0	0	0	0	0	0	0	0	62
12	14	0	0	0	2,175	0	0	0	0	0	2,175	0	0	2,175	0	0	0	0	0	0	2,175
12	15	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1
12	17	0	0	0	68	0	0	0	0	0	68	68	0	0	0	0	0	0	0	0	68
12	18	0	0	0	2	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	2
12	20	0	0	0	58	0	0	0	0	0	58	0	0	0	0	58	0	0	0	0	58
12	21	0	0	0	741	0	0	0	0	0	741	0	0	0	0	0	591	16	128	6	741
13	2	66	0	0	0	0	0	0	0	0	66	12	54	0	0	0	0	0	0	0	66
13	6	164	0	0	0	0	0	0	0	0	164	0	0	164	0	0	0	0	0	0	164
13	8	455	0	0	0	0	0	0	0	0	455	0	0	0	0	0	437	18	0	0	455
13	9	90	0	0	0	0	0	0	0	0	90	0	0	0	0	90	0	0	0	0	90
13	10	6	0	0	0	0	0	0	0	0	6	0	6	0	0	0	0	0	0	0	6
13	12	190	0	0	0	0	0	0	0	0	190	0	0	0	190	0	0	0	0	0	190
13	14	113	0	0	0	0	0	0	0	0	113	0	0	113	0	0	0	0	0	0	113
13	15	160	0	0	0	0	0	0	0	0	160	86	74	0	0	0	0	0	0	0	160
13	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	18	11	0	0	0	0	0	0	0	0	11	7	4	0	0	0	0	0	0	0	11
13	20	9	0	0	0	0	0	0	0	0	9	0	0	0	0	9	0	0	0	0	9
13	21	272	0	0	0	0	0	0	0	0	272	0	0	0	0	0	226	22	24	0	272
14	2	0	0	40	0	0	0	0	0	0	40	28	12	0	0	0	0	0	0	0	40
14	6	0	0	14,352	0	0	0	0	0	0	14,352	0	0	14,352	0	0	0	0	0	0	14,352
14	8	0	0	5,534	0	0	0	0	0	0	5,534	0	0	0	0	0	5,458	76	0	0	5,534
14	9	0	0	153	0	0	0	0	0	0	153	0	0	0	0	153	0	0	0	0	153
14	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	12	0	0	3,270	0	0	0	0	0	0	3,270	0	0	0	3,270	0	0	0	0	0	3,270
14	13	0	0	20	0	0	0	0	0	0	20	20	0	0	0	0	0	0	0	0	20
14	17	0	0	88	0	0	0	0	0	0	88	88	0	0	0	0	0	0	0	0	88
14	18	0	0	4	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	4
14	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	21	0	0	439	0	0	0	0	0	0	439	0	0	0	0	0	435	2	2	0	439
17	2	39	2,843	0	0	0	0	0	0	0	2,882	32	2,850	0	0	0	0	0	0	0	2,882
17	6	305	1,621	0	0	0	0	0	0	0	1,926	0	0	1,926	0	0	0	0	0	0	1,926
17	8	1,001	1,631	0	0	0	0	0	0	0	2,632	0	0	0	0	0	2,533	99	0	0	2,632
17	9	136	4	0	0	0	0	0	0	0	140	0	0	0	0	140	0	0	0	0	140
17	10	6	0	0	0	0	0	0	0	0	6	6	0	0	0	0	0	0	0	0	6
17	12	305	0	0	0	0	0	0	0	0	305	0	0	0	305	0	0	0	0	0	305
17	13	36	15	0	0	0	0	0	0	0	51	51	0	0	0	0	0	0	0	0	51
17	14	333	0	0	0	0	0	0	0	0	333	0	0	333	0	0	0	0	0	0	333
17	15	138	0	0	0	0	0	0	0	0	138	20	118	0	0	0	0	0	0	0	138
17	18	266	4	0	0	0	0	0	0	0	270	270	0	0	0	0	0	0	0	0	270
17	20	22	0	0	0	0	0	0	0	0	22	0	0	0	0	22	0	0	0	0	22
17	21	657	957	0	0	0	0	0	0	0	1,614	0	0	0	0	0	1,345	92	156	21	1,614
19	2	85	0	0	0	0	0	0	0	0	85	34	51	0	0	0	0	0	0	0	85
19	6	76	0	0	0	0	0	0	0	0	76	0	0	76	0	0	0	0	0	0	76
19	8	0	127	0	0	0	0	0	0	0	127	0	0	0	0	0	124	3	0	0	127
19	10	0	109	0	0	0	0	0	0	0	109	0	109	0	0	0	0	0	0	0	109
19	12	17	0	0	0	0	0	0	0	0	17	0	0	0	17	0	0	0	0	0	17
19	13	5	4	0	0	0	0	0	0	0	9	9	0	0	0	0	0	0	0	0	9
19	14	25	0	0	0	0	0	0	0	0	25	0	0	25	0	0	0	0	0	0	25
19	15	21	0	0	0	0	0	0	0	0	21	15	6	0	0	0	0	0	0	0	21
19	17	244	0	0	0	0	0	0	0	0	244	244	0	0	0	0	0	0	0	0	244
19	21	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1
20	2	0	0	0	0	28	0	0	0	0	28	18	10	0	0	0	0	0	0	0	28
20	6	0	0	0	0	352	0	0	0	0	352	0	0	352	0	0	0	0	0	0	352
20	9	0	0	0	0	780	0	0	0	0	780	0	0	0	0	780	0	0	0	0	780
20	12	0	0	0	0	76	0	0	0	0	76	0	0	0	76	0	0	0	0	0	76
20	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	17	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	4
21	2	0	0	0	0	0	669	58	36	52	815	270	545	0	0	0	0	0	0	0	815
21	6	0	0	0	0	0	1,219	0	0	0	1,219	0	0	1,219	0	0	0	0	0	0	1,219
21	8	0	0	0	0	0	12,215	4,214	3,951	941	21,321	0	0	0	0	0	12,215	4,214	3,951	941	21,321
21	9	0	0	0	0	0	131	61	60	16	268	0	0	0	0	268	0	0	0	0	268
21	12	0	0	0	0	0	584	75	47	13	719	0	0	0	719	0	0	0	0	0	719
21	13	0	0	0	0	0	26	8	6	0	40	40	0	0	0	0	0	0	0	0	40
21	14	0	0	0	0	0	191	0	0	4	195	0	0	195	0	0	0	0	0	0	195
21	15	0	0	0	0	0	83	19	18	10	130	20	110	0	0	0	0	0	0	0	130
21	17	0	0	0	0	0	145	34	22	3	204	204	0	0	0	0	0	0	0	0	204
21	21	0	0	0	0	0	252	0	60	15	327	0	0	0	0	0	75	0	240	12	327

Appendix 2. Study of the Space Utilization under the Thamrin/Sudirman Street

Constructing connecting passageway to the existing Sudirman Station - MRT and Shopping Mall under the Thamrin Street were investigated as PPP Project to utilize public land.

Conceptual Drawings are as follows;

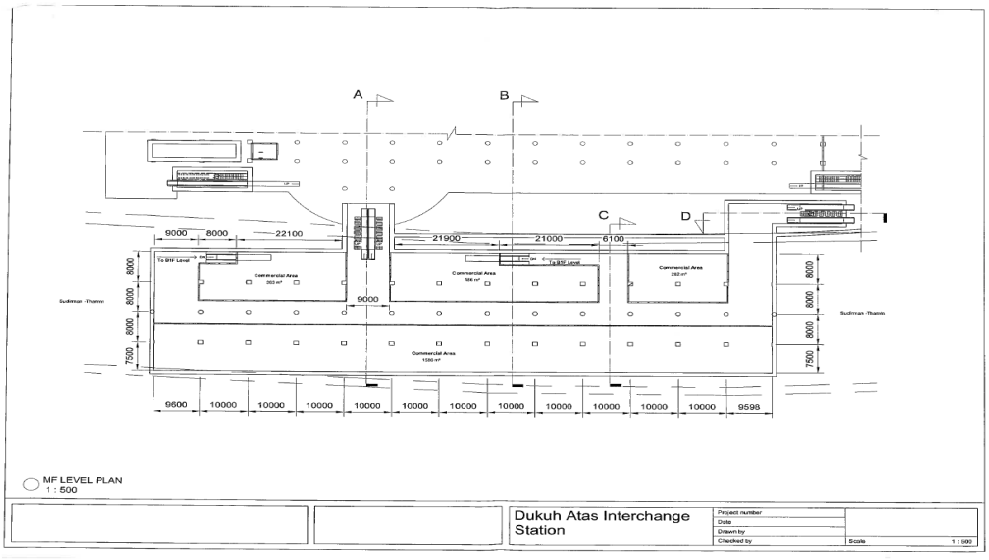


Figure-A2-1 MF LEVEL PLAN

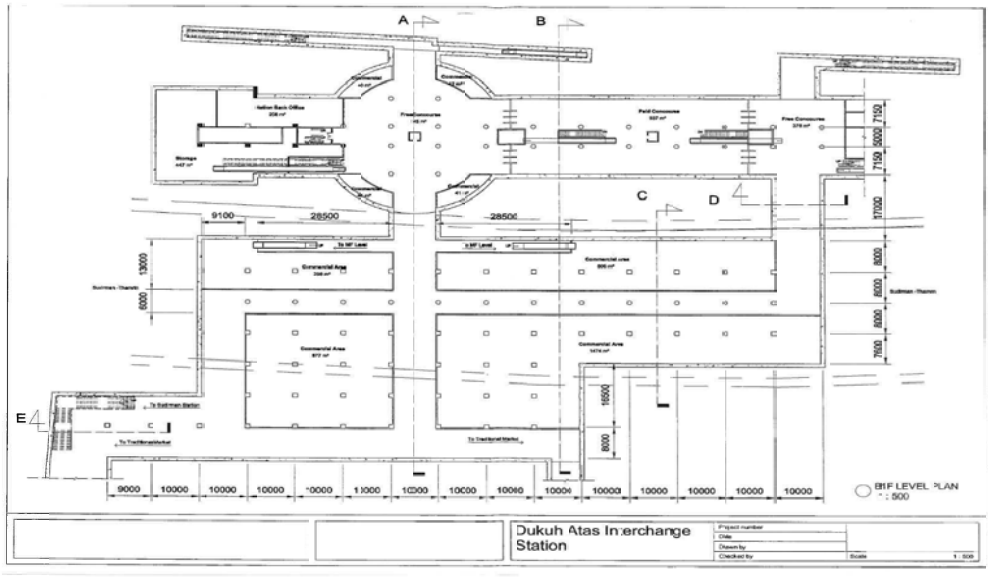


Figure-A2-2 B1 LEVEL PLAN

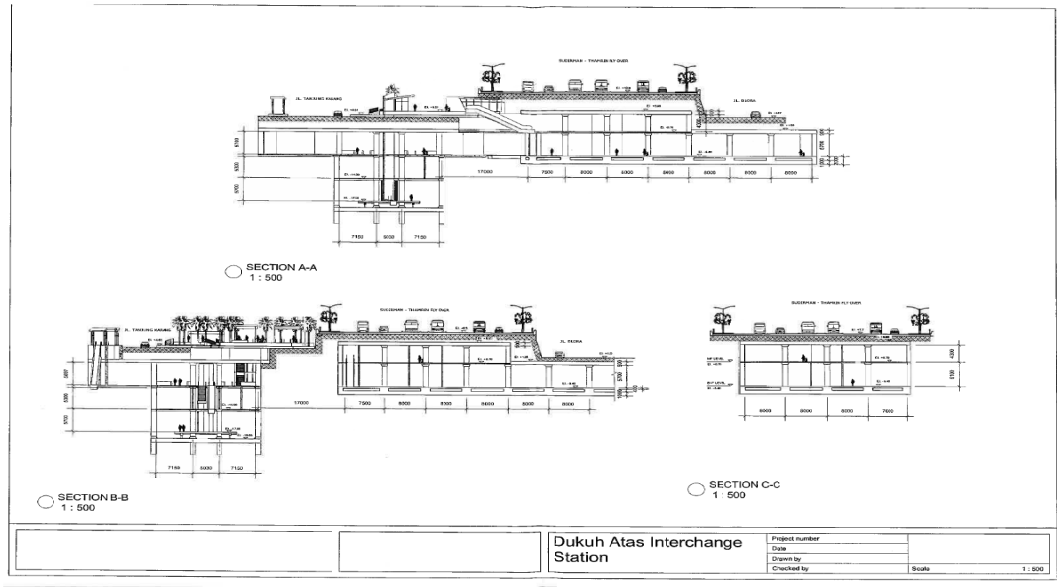


Figure-A2-3 CROSS SECTION (1)

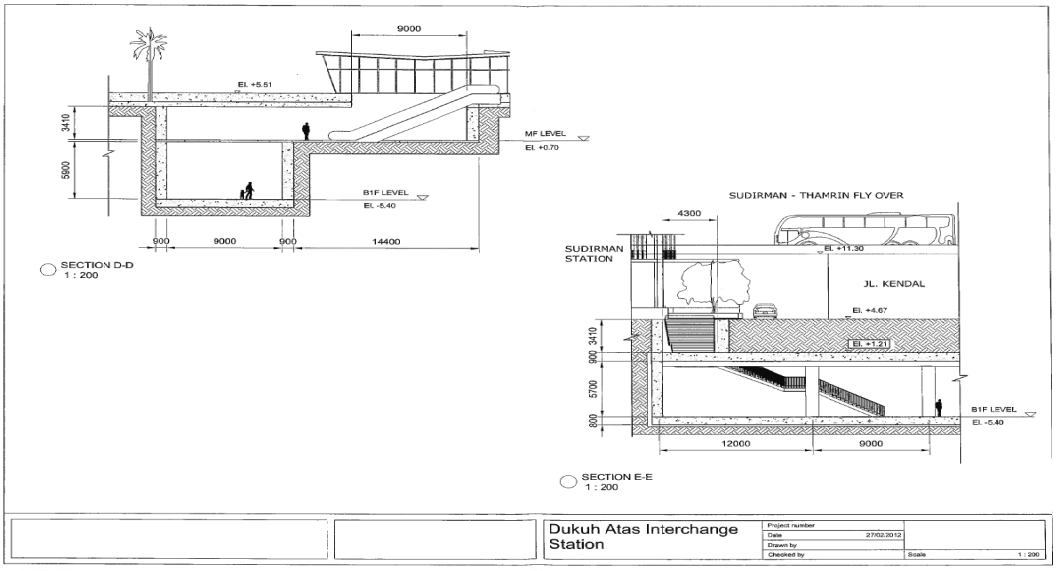


Figure-A2-4 CROSS SECTION (2)

In this case, the construction cost is estimated to become approximately 7,000 million Yen (USD80 mill). In addition, adverse impacts for the traffics on Thamrin street would be extremely heavy during construction of underground of its street. It would be very difficult to cover construction and maintenance costs of the underground structures by the interests to be gained from the commercial facilities. In general, management of underground mall is very difficult even if the cost of underground Shopping Mall structure was borne by the public. Thus, as a result of discussions with the Indonesian Counterpart, it was decided to construct only underground passageway but not Shopping Mall under Phase-1 Project.

Appendix 3. List of environmental standards related to arsenic

In Japan, there are very stringent laws and regulations concerning arsenic (Table A3-1). Arsenic is strictly regulated under Japan's Water Pollution Prevention Law, which limits arsenic to 0.1 mg/L. In Europe, the European Standard EN 71-3 on Safety of Toys limits arsenic to 25 mg/kg, also a very low level. The Food Sanitation Law includes arsenic regulations, and standards are set for toys depending on their types.

Table-A3-1. Major laws and standards related to arsenic

Law or standard	Regulated substance	Limit
Basic Environment Law and environmental standards: River and lake water, etc.	Arsenic	0.01 mg/L
Water Pollution Prevention Law and effluent standards: Factory effluent, etc.	Arsenic and arsenic compounds	0.1 mg/L
Soil Contamination Countermeasures Law and soil environmental standards: Soil	Arsenic	0.01 mg per liter of liquid sample
Farmland		Less than 15 mg per kg of soil
Food Sanitation Law	Arsenic	25 µg/g
European Standard EN 71-3 on Safety of Toys: Toys	Arsenic	25 mg/kg
Industrial Safety and Health Law and working environment assessment standards	Arsenic and arsenic compounds	0.003 mg/m^3 as arsenic
Waste Disposal and Public Cleaning Law	Arsenic or arsenic compounds	0.3 mg per liter of liquid sample; 0.15 mg per kg of specimen, etc.

Source: Compiled by the Study Team, based on http://www.boken.or.jp/lib_anzen_seni_jyuukinzoku7.html

Appendix 4. Bibliography

Table- A 4-1 Bibliography, Document

Chapter	Bibliography, Document
1.1.2	Country Assistance Program for Republic of Indonesia: April 2012
2.1.1	Basic Information on Indonesia: ASEAN-JAPAN CENTRE
2.2.1	Jakarta Selatan Dalam Angka 2012: Kota Administrasi Jakarta Pusat
2.2.1	Jakarta Selatan Dalam Angka 2012: Kota Administrasi Jakarta Selatan
2.2.1	Engineering Consulting Service for Jakarta Mass Rapid Transit System Project Basic Engineering Design Report (Final)
2.2.2	RTRW DKI Jakarta 2030 versi Februari
2.2.2	RENCANA TATA RUANG WILAYAH DKI JAKARTA 2030
2.2.2	Panduan Rancang Kota Kawasan Dukuh Atas DKI 2008
2.2.3	Engineering Consulting Services for Jakarta Mass Transit System Project
2.2.3	Preparatory Survey for Jakarta Mass Transit East-West Line Project: 2011,11,JICA
2.2.4	Preparatory Survey for JABODETABEK Railway Capacity Enhancement Project: JICA
2.2.6	PPP Infrastructure Plans in Indonesia: 2011 BAPPENAS
2.2.7	PPK Pengembangan Koridor MRT Jakarta versi februari 2012 draft
2.4.1	Study on Railway Station Revitalization：JBIC, 2008,7
4.1.2	JABODETABEK Urban Transportation Policy Integration：JUTPI, 2011, JICA
4.12	Engineering Consulting Services for Jakarta Mass Rapid Transit System Project: 2011, JMEC,DGR
4.1.3	Preparatory Survey for JABODETABEK Railway Capacity Enhancement Project: 2011,JICA
4.1.3	Basic Engineering Design Report of Engineering Consulting Service for Jakarta Mass Rapid Transit System Project
4.1.3	Preparatory Survey for Jakarta Mass Transit East-West Line Project: 2011,11,JICA
4.1.3	Project for the Study on JABODETABEK Public Transportation Policy Implementation Strategy (JAPTraPIS)：JAPTraPIS, 2012, JICA
4.1.6	Project for the Master Plan Study on Multiple-Airport Development for Greater Jakarta Metropolitan Area in the Republic of Indonesia: JICA
4.3.1	“PEDESTRIAN Planning and design”, JOHN J.FRUIN