

**Environmental and Social Considerations
(Technical Cooperation for Development Planning)**

1. Full title of the Project

The Project for Water Supply Master Plan for City of Kigali (hereinafter referred to as 'the Project')

2. Type of the Study

Master Plan

3. Categorization and its reason

(1) Category: B

(2) Reason: The project is not likely to have significant adverse impact on the environment under the JICA Guidelines for Environmental and Social Considerations (April, 2010) in terms of its sectors, characteristics and areas.

4. Agency or institution responsible for the implementation of the Project

Water and Sanitation Corporation (WASAC) (responsible section is Urban Water and Sanitation Services (UWSS)) including six branches of WASAC in City of Kigali, i.e. Kacyiru, Nyamirambo, Remera, Gikondo, Kanombe, Nyarugenge Branch

5. Outline of the Project

5.1 Objectives

Targeting City of Kigali and seven adjacent sectors, i.e. Shyorongi, Runda, Rugarika, Ntarama, Muyumbu, Gahengeri, and Nyakaliro, through preparing the Water Supply Master Plan for City of Kigali, the Project contributes to increase the quality of water supply services.

5.2 Location

City of Kigali and seven adjacent sectors, i.e. Shyorongi, Runda, Rugarika, Ntarama, Muyumbu, Gahengeri, and Nyakaliro.

5.3 Scope of the Project

The scope of the Project would include the evaluation of current water supply services, water demand forecast, preparation of water resource utilization plan, preparation of Water Supply Master Plan for City of Kigali, preparation of 15-Year Investment Plan, feasibility studies on prioritized projects, and capacity development for WASAC's staffs.

5.3.1 Outputs

Output 1 : Current conditions of existing water supply facilities and water supply services in the project site are assessed.

Output 2 : Water demand in the project site is forecasted, and water resource utilization plan is developed.

Output 3 : Water Supply Master Plan for City of Kigali is developed.

Output 4 : Prioritized projects are identified from 15-Year Investment Plan, and their feasibility studies are conducted.

Output 5 : Capacity of WASAC's staffs about water supply planning is strengthened.

5.3.2 Activities

Output 1 : Current conditions of existing water supply facilities and water supply services in the project site are assessed.

- To survey water supply situation such as water service areas, population and coverage, water supply hours, non-revenue water ratio, water resources, water quality, water distribution pressure, etc.
- To survey conditions of water supply facilities such as water intake facilities, water treatment facilities, water pipes, water reservoirs, etc.
- To survey socio-economic and natural conditions
- To study relevant laws, regulations and policies about water supply, infrastructure development, environmental and social considerations, etc.
- To study relevant projects for city development, water supply, etc.
- To study organizational and institutional structure for water supply
- To study WASAC's financial conditions

Output 2 : Water demand in the project site is forecasted, and water resource utilization plan is developed.

- Referring to relevant socio-economic development plans, statistics, etc., to develop socio-economic development stories including economic and population growth, etc. until 2050
- Through evaluation based on criteria, to select the most appropriate socio-economic development story
- Based on the most appropriate socio-economic development story and framework of MP considered in Output 3, to forecast water demand until 2050
- To review existing plans and surveys about water resources, data about current water resources used for water supply in City of Kigali
- To identify new possible water resources (surface water and/or groundwater) through site survey and measurement
- To develop scenarios to meet water demand until 2050. The scenarios include plans about increase of intake from existing water resources and/or development new intake from new water resources, and plans about water treatment plan and water transmission from water resources up to water distribution areas in the project site
- Through evaluation based on criteria, to select the most appropriate scenario, as a Master Scenario, to meet water demand until 2050

Output 3 : Water Supply Master Plan for City of Kigali is developed.

- To develop a framework of MP including vision of water supply until 2050, phased targets (water supply coverage, water supply hours, leakage water quality, etc.), policy on facility planning, design criteria (unit water demand, design loading rate, etc.), etc.
- Based on the Master Scenario, to develop a 15-Year Investment Plan for the most recent next 15 years. The 15-Year Investment Plan includes a water facility plan (improvement and/or repair of existing facilities and/or new facilities), plan for water distribution areas with distribution trunk mains, plan for major water distribution blocks, operation maintenance plan, organization structure to supply water in the

project site, capacity development plan for WASAC, implementation plan including a list of necessary projects for the 15-Year Investment Plan, cost estimation and budgeting plan (including the most appropriate proposal about a tariff system), etc.

- To conduct financial and economic analysis about the 15-Year Investment Plan
- To conduct strategic environmental assessment (SEA), including alternative analysis, on the Water Supply MP
- To develop Water Supply MP for City of Kigali which includes the Master Scenario until 2050 and the 15-Year Investment Plan

Output 4 : Prioritized projects are identified from 15-Year Investment Plan, and their feasibility studies are conducted.

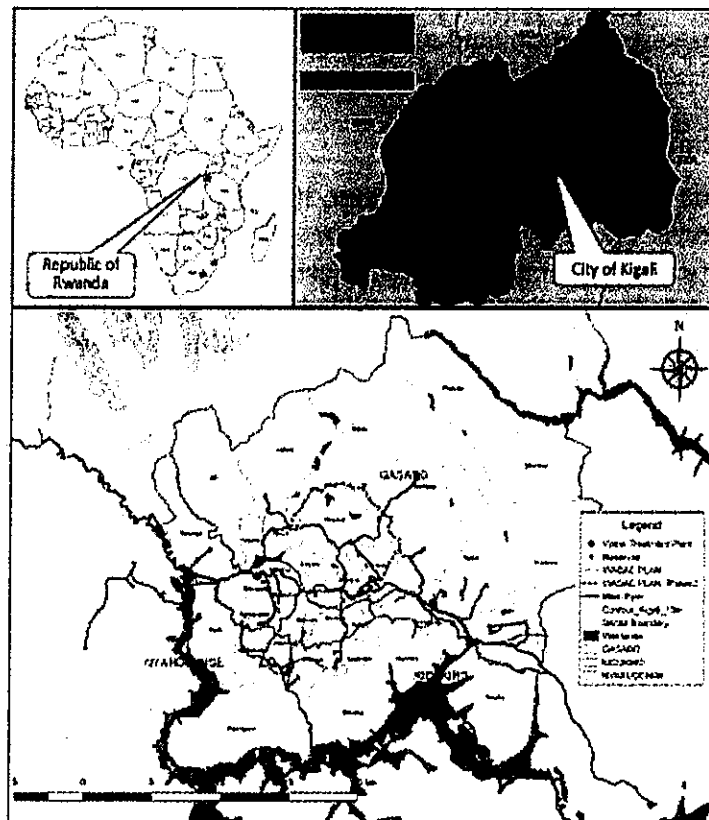
- From the list of necessary projects in the 15-Year Investment Plan, two prioritized project are identified based on criteria
- To conduct feasibility studies, including necessary environmental and social considerations, on the prioritized projects

Output 5 : Capacity of WASAC's staffs about water supply planning is strengthened.

- To prepare a simple capacity development plan mainly by on the job trainings (OJT) through the project activities
- To conduct OJT through co-working with members of JICA Missions

6. Description of the project site

6.1 Location map



6.2 Environmental and social condition

(1) Terrain

Rwanda has an area of 26,338 km² and is an inland country bordered by the Democratic Republic of Congo to the west, Uganda to the north, Tanzania to the east, and Burundi to the south. A mountain range runs from the northwest to the southeast, and the dividing ridge of the Congo and Nile river basins (average altitude above sea level of 2,740 m) runs north to south. The lower part of the slope on the west side is part of the African Great Rift Valley. The east side slopes gradually, and the altitude declines from the central highlands to the plains, swampy land and lakes. In this way, Rwanda is also called “a country of a thousand hills” because it has a rough terrain formed from valleys and hills. City of Kigali is located in the high altitude area near the center of Rwanda (GL+ 1,433 to +1,645 m).

(2) Geology

In Rwanda, basement rocks composed of granitic rocks and metamorphic rocks belonging to the Precambrian era are widely distributed. The granitic rocks are intrusive rocks and metamorphic rocks are mainly composed of granitic rocks metamorphosed due to penetration. After the Cenozoic, activity of the African Great Rift Zone became active, and it was covered with volcanic ejecta by volcanic activity. After that, volcanic sediments gradually developed, sediments carried from scree (talus) layers on hill slopes and sediment from upstream rivers accumulated, forming alluvial lowlands and wetlands along the valleys. As for the geologic structure, metamorphic rocks are distributed in north-south belt-like bands because pressure from Great Rift Zone geological activity pushing in an east-west direction, and many faults of the same orientation are observed.

(3) Climate and Rainfall

Although Rwanda is located near the equator, it belongs to a temperate climate because of its high sea level. The average daily temperature of City of Kigali is 21.3 °C. The season is roughly divided into the long rainy season (March to May), the long dry season (June to September), the short rainy season (October to December), the short dry season (January to February), and during the rainy season almost every day heavy rains and sunny weather occur alternately.

Average Temperature and Rainfall in City of Kigali

Month	Ave. temperature			Annual Ave. rainfall (mm)	Rainfall days
	Min. Temp.	Max. Temp.	Ave. Temp.		
Jan.	15.6	26.9	21.3	77	11
Feb.	15.8	27.4	21.6	91	11
Mar.	15.7	26.9	21.3	114	15
Apr.	16.1	26.2	21.2	154	18
May.	16.2	25.9	21.1	88	13
Jun.	15.3	26.4	20.9	19	2
Jul.	15.0	27.1	21.1	11	1
Aug.	16.0	28.0	22.0	31	4
Sep.	16.0	28.2	22.1	70	10
Oct.	15.9	27.2	21.6	106	17
Nov.	15.5	26.1	20.8	113	17
Dec.	15.6	26.4	21.0	77	14
Ave.	15.7	26.9	21.3	951	11.1

Source: Kigali State Environment and Outlook Report 2013

(4) Water Source and Water Quality

Rwanda has plentiful water resources. The western part occupies most of the rainfall and the eastern part is relatively dry. Of the land, 33% is supplied water by the Congo River basin, while the remaining 67% by the Nile River basin. There are 149,487 ha of lakes, 278,536 ha of wetlands and 861 rivers (total length of 6,462 km) in Rwanda.

Burera Lake, Ruhondo Lake, Kivu Lake have been confirmed to have a depth of over 50 m. Meanwhile, Mugesera, Sake, Birara, Cyohoha, Rweru and Ihema Lakes, etc., which are also the source of water distribution networks of Kigali City, are shallower than water depth of 10 m.

The Rwanda National Water Resources Master Plan (NWRMP) formulated by Ministry of Natural Resources gives the following as Rwanda's main water quality problems. Also, in the future, domestic and industrial wastewaters are expected to increase in Rwanda, therefore, water pollution is also a concern. Water source protection will also lead to a reduction in water-borne diseases, so it is a future important issue.

- Detection of E. coli-type bacteria from untreated (and untested) sewage
- High organic load, biochemical oxygen demand (BOD), chemical oxygen demand (COD)
- Very high sediment concentration and turbidity

In the report of "Basic Data Collection Study on Water Resource Development and Improvement of Water Supply Facilities in Africa" conducted by JICA in 2015, Rwanda has a large population, so the per capita water resource availability is as low as 604 m³/person/year. Falkenmark Water Stress Indicator¹ is 1,700 m³/person/year or less, and it is supposed to be in a state of high water stress in Rwanda.

(5) Population

According to the Fourth Population and Housing Census, Rwanda 2012 (RPHC4), the population of Kigali City is 1,132,686 (2012). The population of three districts in Kigali City is as follows: Nyarugenge District: 284,561; Gasabo District: 529,561; Kicukiro District: 318,564.

(6) Percentage of Private Households Headed by Women

At the national level (the total number of households is 2,424,898 in 2012), three households out of ten (29%) are headed by women. Female-headed households are slightly more common in rural areas (30%) than in urban areas (24%).

In Kigali City (the total number of households is 286,664 in 2012), 22% are headed by women. The highest percentages of female-headed households are found in the Districts of Huye, South (37%) and Gisagara, South (35%) and the smallest in the Kigali City's Districts of Kicukiro (21%) and Gasabo (22%).

7. Legal Framework of Environmental and Social Considerations

7.1 Laws and Regulations

Ministerial Order No. 003/2008 of 15/08/2008 relating to the Requirements and Procedure for Environmental Impact Assessment deals with its procedure. Ministerial Order No. 004/2008 of 15/08/2008 establishes the List of Works, Activities and Projects that have to Undertake an Environment Impact Assessment stipulates projects required EIA. These two orders are basis for the EIA system in Rwanda.

7.2 Responsible Organizations

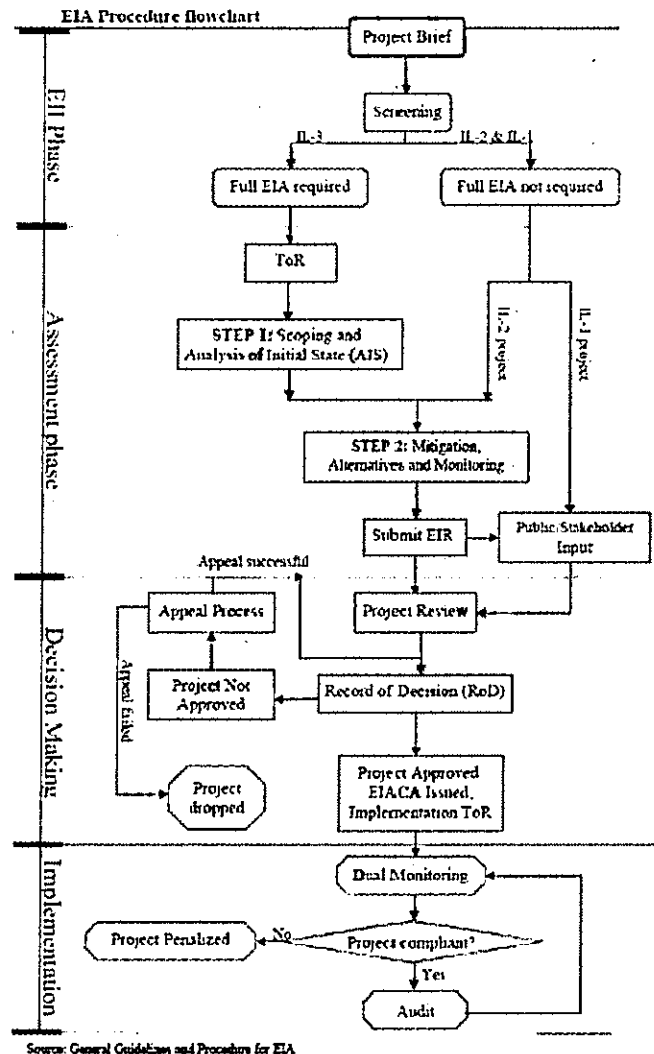
The Rwanda Development Board (RDB) is responsible for evaluating and issuing a certificate of EIA. After a project starts, the Rwanda Environmental Management Authority (REMA) conducts monitoring on implementation of environmental management plan and environmental monitoring plan by a project.

7.3 EIA Procedures

By Article 67 of No.04/2005 Organic Law determining the modalities of protection, conservation and promotion of environment in Rwanda, it is stipulated that every project, program and policy shall be subjected to environmental impact assessment, before obtaining authorization for its implementation. By Article 69 of it, it is stipulated that the environmental impact assessment shall be examined and approved by the Rwanda Environmental Management Authority (after 2009, by RDB). General Guidelines and Procedure for EIA (2006) states EIA procedure, example of ToR for EIA study, contents of EIA report, public participation, etc. EIA must be carried out by EIA experts (individual or company) authorized by the Ministry of Natural Resources.

The figure below shows a main flow of EIA procedures. The first step is the screening. For the screening process, a project proponent needs to submit a project brief which contains outline of project to Ministry of Finance and Economic Planning (MINECOFIN),

and then whether a project needs full EIA or not is judged. In the Project, the screening process will be done when the FS of prioritized projects starts, and necessary environmental and social considerations will be conducted.



EIA Procedures

7.4 SEA Procedures

In Rwanda, the General Guidelines and Procedures for SEA were issued in June 2011. However, though SEA instrument appears to be common in Rwanda, only EIA is adequately supported by the Rwandan law.

According to RDB, the Project needs SEA because of developing the Water Supply Master Plan. The Project can refer to the SEA process described in the the General Guidelines (refer to 'SEA Process and Procedures' below). However, the process mainly targets on PPP projects in Rwanda. The Project needs close consultation with RDB and REMA to identify the appropriate SEA process during the project period.

SEA Process and Procedures

- STEP 1. Identifying the Main Characteristics of the PPP
- STEP 2. Analyzing the PPP Formulation Process
- STEP 3. Determining the Need for SEA for a PPP
- STEP 4. Determining the Nature and Extent of Impacts
- STEP 5. Determining Content and Level of Detail in SEA Report
- STEP 6. Consultation with Relevant Authorities
- STEP 7. Public Consultation
- STEP 8. Ensuring SEA Integration in the PPP Process
- STEP 9. Coordinating SEA within the PPP Process
- STEP 10. Monitoring SEA within the PPP Process

8. Provisional Scoping

Provisional scoping was done and mitigation measures were proposed for the Project.

Provisional Scoping

Item	Rating	Rational of Assessment	Forecast Procedure	Mitigation Measure to be considered
[Pollution]				
Air Pollution	B-	<ul style="list-style-type: none"> • If projects for facility development proposed in Water Supply Master Plan are implemented, a certain amount of air pollution is expected from use of vehicles and heavy machines during construction works 	<ul style="list-style-type: none"> • Collection and review of existing information of the laws and regulations regarding air quality • Collection and review of existing meteorological information • Collection and review information about pollutants from vehicles and heavy machines during construction works 	<ul style="list-style-type: none"> • Re-examination of construction site • Deliberated construction planning and supervision • Prevention of dust pollution by watering etc.
Water Pollution	B-	<ul style="list-style-type: none"> • If projects for facility development proposed in Water Supply Master Plan are implemented, a certain amount of water pollution is expected due to muddy water, drilling of wells, etc. during construction stage 	<ul style="list-style-type: none"> • Collection and review of existing information of the laws and regulations regarding water quality • Collection and review of existing information regarding water use, current water quality, and aquatic organism, etc. 	<ul style="list-style-type: none"> • Re-examination of construction site • Deliberated construction planning and supervision
Soil Contamination	D	<ul style="list-style-type: none"> • No impact is expected 	—	—
Waste	B-	<ul style="list-style-type: none"> • If projects for facility development proposed in 	<ul style="list-style-type: none"> • Collection and review of existing information 	<ul style="list-style-type: none"> • Deliberated construction planning and

Item	Rating	Rational of Assessment	Forecast Procedure	Mitigation Measure to be considered
		Water Supply Master Plan are implemented, temporary impact is expected in case of illegal dumping of construction waste during construction stage	of the laws and regulations regarding disposal of waste • Collection and review information about types and volume of construction waste	supervision • Securement of disposal site
Noise and Vibration	B-	• If projects for facility development proposed in Water Supply Master Plan are implemented, a certain amount of noise and vibration is expected during construction works	• Collection and review of existing information of the laws and regulations regarding noise and vibration • Collection and review of information regarding distribution of sensitive facilities, e.g. schools, religious facilities, etc.	• Deliberated construction planning and supervision, e.g. no vibration piling, construction timing or working hours, installation of sound insulating wall shock-absorbing facility, etc.
Land Subsidence	B-	• A certain amount of decline of groundwater level due to excess pumping of wells during operation stage might occur	• Collection and review of information regarding groundwater use condition, hydrogeological data, and geological conditions • Survey on groundwater level, and consideration on appropriate pumped groundwater volume	• Setting up of groundwater pumping rate during operation
Offensive Odor	D	• No impact is expected	—	—
Bottom Sediment	B-	• If projects for facility development proposed in Water Supply Master Plan are implemented, a certain impact on bottom sediment is expected due to muddy water during construction stage	• Collection and review of information regarding river bed deposit and aquatic organism	• Deliberated construction planning and supervision • Re-examination of construction site
【Natural Environment】				
Protected area / Forest	D	• No impact is expected because no projected area and forest exist in the project area.	—	—
Ecosystem	B-	• If projects for facility development proposed in Water Supply Master Plan are implemented, a certain impact on ecosystem is expected	• Collection and review of data regarding habitat and distribution of aquatic organism	• Deliberated construction planning and supervision • Re-examination of construction site • Setting up of appropriate surface water intake rate

Item	Rating	Rational of Assessment	Forecast Procedure	Mitigation Measure to be considered
		due to muddy water during construction stage • If intake from surface water is increased, a certain impact on ecosystem is expected due to excessive water intake		during operation
Hydrology	B-	• If groundwater use and surface water intake increases, a certain impact on hydrology is expected during operation	• Collection and review of data and information regarding groundwater level, river flow, etc.	• Setting up of groundwater pumping rate and appropriate surface water intake rate during operation
Topography and Geology	B-	• If projects for facility development proposed in Water Supply Master Plan are implemented, a certain level of impact on topography, e.g. large scale excavation for transmission pipe line, etc., is expected	• Collection and review of data and information regarding topography, geology and geography	• Deliberated construction planning and supervision • Re-examination of construction site
Groundwater	B-	• A certain amount of decline of groundwater level due to excess pumping of wells during operation stage might occur	• Collection and review of information regarding groundwater use condition, hydrogeological data, and geological conditions • Survey on groundwater level, and consideration on appropriate pumped groundwater volume	• Setting up of groundwater pumping rate during operation
【Social Environment】				
Involuntary Resettlement	C-	• Extent of involuntary resettlement is unknown	• Survey on involuntary resettlement by prioritized projects	• Mitigation measures will be prepared based on survey
Local economy such as employment and livelihood etc.	C+/-	• Extent of impact on local economy is unknown	• Survey on impact on local economy in the project site	• Mitigation measures will be prepared based on survey
Cultural heritage	C-	• Extent of impact on cultural heritage is unknown	• Survey on cultural heritage in the project site	• Mitigation measures will be prepared based on survey
Landscape	C-	• Impact for the landscape is unknown	• Survey on landscape in the project site	• Mitigation measures will be prepared based on survey

Item	Rating	Rational of Assessment	Forecast Procedure	Mitigation Measure to be considered
Ethnic minorities and indigenous peoples	C-	• Extent of impact on ethnic minorities and indigenous peoples is unknown	• Survey on ethnic minorities and indigenous peoples in the project site	• Mitigation measures will be prepared based on survey
Poverty group	C+/-	• Extent of impact on poverty group is unknown	• Survey on poverty group in the project site	• Mitigation measures will be prepared based on survey
Working conditions (including occupational safety)	B+	• Water Supply Master Plan will contribute to working conditions	—	—
Water use	B-	• If groundwater use and surface water intake increases, a certain impact on water use is expected	• Collection and review of existing information regarding water use	• Setting up of groundwater pumping rate during operation • Setting up of appropriate surface water intake rate during operation
Accidents	B-	• If projects for facility development proposed in Water Supply Master Plan are implemented, increase of traffic of construction vehicles during construction lead to potential for accidents	• Collection and review of information related to road traffic regulations	• Deliberated construction planning and supervision • Provision of rate limit and make caution to people at schools, markets, residential areas, etc.
Land use and utilization of local resources	B-	• If new groundwater resources are developed, and groundwater use and surface water intake increases, a certain impact on land use and utilization of local resources is expected	• Collection and review of existing information regarding land and water use	• Re-examination of construction site • Setting up of groundwater pumping rate during operation • Setting up of appropriate surface water intake rate during operation
Existing infrastructures and social services	C+/-	• Extent of impact on existing infrastructures and social services is unknown	• Survey on existing infrastructures and social services in the project site	• Mitigation measures will be prepared based on survey
Social capitals and decision making institutions	C+/-	• Extent of impact on social capitals and decision making institutions is unknown	• Survey on social capitals and decision making institutions in the project site	• Mitigation measures will be prepared based on survey
Imbalance of costs and benefits	C+/-	• Extent of impact on imbalance of costs and benefits is unknown	• Survey on imbalance of costs and benefits in the project site	• Mitigation measures will be prepared based on survey
Local conflict	C+/-	• Extent of impact on local conflict is unknown	• Survey on local conflict in the project site	• Mitigation measures will be prepared based on survey
Gender equality	B+	• Currently, many women go to take water from springs, wells, etc. If	—	—

Item	Rating	Rational of Assessment	Forecast Procedure	Mitigation Measure to be considered
		water supply conditions are improved based on Water Supply Master Plan, its burden will be less.		
Infectious diseases HIV/AIDS	B-	<ul style="list-style-type: none"> If projects for facility development proposed in Water Supply Master Plan are implemented, a certain level of spread of infection diseases is expected by increase of site worker for construction 	<ul style="list-style-type: none"> Collection and review of data and information regarding infection diseases /HIV/AIDS. 	<ul style="list-style-type: none"> Instruction and education on construction workers
Climate change	D	<ul style="list-style-type: none"> No impact is expected 	—	—

Note 1) The items are selected based on the JICA Guidelines for Environmental and Social Considerations (April, 2010)

Note 2) Rating:

A: Significant impact is expected (+: Positive impact, -: Negative impact)

B: Some impact is expected (+: Positive impact, -: Negative impact)

C: Extent of impact is unknown, further examination will be required (+: Positive impact, -: Negative impact)

D: No impact is expected

9. Alternatives to the project activities including “without project” option

The aim of the Project is to develop a comprehensive master plan for the improvement of the existing water supply facilities and new facilities under more efficient and effective manner in Kigali City. Without the master plan, there is a concern that the operation of water supply facilities remains unstable and water cannot reach some areas in Kigali City. As a result, the water supply service cannot meet the demand by the rapid-growing population in the project area. Thus, the master plan is indispensable for the project area.

In the Project, two prioritized projects will be proposed and their feasibility studies will be conducted. Alternatives will be examined in the feasibility studies.

10. Result of the consultation with recipient government on environmental and social consideration including roles and responsibilities

WASAC will follow the laws and regulations relevant to environmental and social considerations in Rwanda. In addition, WASAC will abide by JICA Guidelines for Environmental and Social Considerations (April, 2010) in order to ensure that appropriate considerations will be made for the environmental and social impacts of the Project.

11. Terms of reference for environmental and social considerations

Provisional Terms of Reference (TOR) for Environmental and Social Considerations for the Project in line with the JICA Guidelines for Environmental and Social

Considerations (April, 2010) is as follows:

Terms of Reference

Environmental and Social Considerations Study

1. Review of existing development plans, development projects, studies, and public and private investments relevant to the water supply sector in Rwanda;
2. Consideration on goal and/or purpose, and contents of the master plan;
3. Analysis of alternatives for achieving goal and/or purpose of the master plan;
4. Conducting of scoping of the master plan;
5. Conducting of baseline surveys including land use, natural environment, socio-economic conditions in the project area;
6. Review of institution and organization about environmental and social considerations in Rwanda;
 - 1) Collecting information on laws, regulations and standards, such as environmental impact assessment, pollution control, resettlement, public participation, information disclosure to the public, etc.;
 - 2) Confirming legal and organizational framework on environmental and social considerations;
 - 3) Review of previous Strategic Environmental Assessment (SEA) Study reports and/or experiences which were conducted in Rwanda;
 - 4) Gap analysis between these legal frameworks and JICA Environmental Guidelines;
7. Based on the concept of SEA, at Initial Environmental Examination (IEE) level, conducting;
 - Prediction and evaluation of impact of the master plan;
 - Evaluation of alternatives including zero-option scenario;
 - Consideration of mitigation measures; and
 - Consideration of monitoring plan.
8. Support for Rwanda side to hold stakeholder meetings and information disclosure in SEA; and
9. Conducting of necessary environmental and social considerations, including stakeholder meetings and information disclosure, on prioritized projects in their FS.

12. Other relevant information

None