

**The Republic of Ghana**

**Preparatory Survey  
on Mamfe – Koforidua – Bunso Road  
Project (PPP Infrastructure Project)  
Final Report**

**November 12<sup>th</sup>, 2020**

**Japan International Cooperation Agency (JICA)**

**MAEDA CORPORATION**

**Sumitomo Heavy Industries Environment Co., Ltd.**

**Daiwa Lease Co., Ltd.**

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## **List of Abbreviation**

(In Alphabetical Order)

CWSA	Community Water and Sanitation Agency
DFR	Department of Feeder Road
DUR	Department of Urban Road
GHA	Ghana Highways Authority
MMDA	Metropolitan, Municipal and District Assemble
MOFEP	Ministry of Finance and Economic Planning
MRH	Ministry of Roads and Highways
MWH	Ministry of Works and Housing
NADMO	National Disaster Management Organization
NBSSI	National Board for Small Scale Industries
WAGRIC	West African Growth Ring Master Plan

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# **1. Background and Objective of the Project**

## **1.1 Background**

The Republic of Ghana is regarded as a gateway in the West Africa, and its economy is the second largest among ECOWAS countries in terms of gross domestic product (GDP), after Nigeria, and has been growing steadily.

The Government of Ghana's sectoral budget for 2019 shows 157% increase in infrastructure sector's budgetary allocation compared with the previous year, and is expected to be comprehensive in its implementation, along with other infrastructure-related projects. On the other hand, the government debt poses a serious issue (government debt to GDP ratio as of 2018: 57.9% of GDP). Therefore, investment in PPP projects for the Government of Ghana will assist to sophisticatedly manage and operate infrastructure by the private sector without any financial burden on the government.

At the 7th Tokyo International Conference on African Development (TICAD VII) in August 2019, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan and the Ministry of Roads and Highways (MRH) of Ghana signed a Memorandum of Cooperation (MoC) for “sustainable economic development and strengthening of cooperation between the two countries by promoting and expanding investment in PPP projects in the road sector and other areas deemed necessary by the two countries”. Further, Memorandum of Understanding (MoU) for "the development of Public-Private Partnership (PPP) Model in the Road Sector in Ghana" has been signed between MRH, Maeda and Index Consulting in the presence of former Minister of Land, Infrastructure and Transport, Mr. Ishii. It is expected that the two governments will fully support for the promotion of road PPP projects both in Ghana and Japan.

The objective of the Project is to develop and promote the “Mamfe - Koforidua -Bunso” Road under PPP Model with unsolicited-basis to acquire a concession right for Road Operations and Maintenance (O&M), by implementing cutting-edge technologies and knowhow of road O&M and surround development of Japan.

For the Preparatory Survey, the professional consultants that have participated in the first and only road concession project in Japan “the Aichi Model” have studied the possibility of implementing different PPP schemes on the “Mamfe - Koforidua - Bunso” Road, granted by JICA (Japan International Cooperation Agency).

In addition to the road PPP project, drainage/sewerage and housing development projects have also been studied as requested by the Government of Ghana, to seek any business collaborative opportunities in the future. Hence, the study scope for these sub-projects will only be limited to information gathering of the current statuses and challenges.

Furthermore, JICA Mission was dispatched to Ghana in February 2020: Upon discussion between MRH and JICA, the “Sunyani - Abuakwa” section (approximately 110 km), has been added to the study scope as an alternative section, which is expected to generate a certain amount of traffic. However, due to budgetary constraints, it is agreed with the Government of Ghana that

the study on the Sunyani and Abuakwa section will only be limited to information gathering with the use of existing database provided by the Government of Ghana.

## **1.2 Objective of the preparatory survey**

The objective of the Preparatory Survey is to establish an optimal project structuring framework with key assumptions on technical, financial, legal and risk allocation basis. The Preparatory Survey is a desktop survey mainly on the Mamfe - Koforidua - Bunso section and alternatively on the Sunyani - Abuakwa section. The study scope has been determined with the consent of relevant governmental agencies of Ghana to develop these two potential road sections under PPP Model.

## **1.3 Outline of the Project**

In Ghana, road transport accounts for approximately 95% of the total transportation and is the foundation for social and economic activities. According to the “Corridor Development for West Africa Growth Ring Master Plan” (WAGRIC), the south-to-north roads including Mamfe - Koforidua - Bunso section are mainly two-lane paved roads, however, long-distance freight transport is not functioning efficiently, which hinders industrial development of the Corridor.

Koforidua City, located in the southeast of Ghana, is one of the oldest cocoa-producing regions in the country, and the main national road, National Road 4 (N4), is considered as an important industrial road as well as a rail transport hub with commercial functions since the completion of the Accra to Kumasi railway in 1923. Regional cities such as Koforidua are responsible for strengthening the infrastructure and economic development to increase service and management functions of neighboring agricultural areas, which in turn attracts local private companies to set up their headquarters and manufacturing plants. As a result, it will improve social service facilities and become not only an economic hub but also a regional settlement center. As of 2015, the population of Koforidua was 141,000, and is currently growing every year which is projected to be more than double to 287,000 by 2040.

The presence of such large cities in rural areas is a major strength of Ghana, and these regional cities have become centers of industrial development in the hinterland, such as central rural service centers and industrial locations.

According to the Ghana Highways Authority ("GHA"), there is a heavy traffic congestion along the West African Corridor (Lagos-Abidjan Corridor) especially near the Greater Accra.

The "Tema Bypass Plan"<sup>1</sup> envisages a bypass to connect to the N4 without going through the capital city of Accra and will be an alternative route of the National Road 6 (N6) to reach Kumasi. This Plan is expected to drive more traffic to N4 and the development of N4 will bring regional revitalization, as various town communities reside along the corridor. Although the current traffic is not as large, the development of N4 has a very high future potential.

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<sup>1</sup> Currently, several road construction initiatives are planned along the Lagos-Abidjan corridor, including the "Accra Outer Ring Road Development" and the "Pokuase - Ritz Junction - Ashalley Botwe - Tema Motorway Road Development".

The "Sunyani - Abuakwa" section, which will be considered as an alternative section, is expected to generate a certain amount of traffic as it is located close to Kumasi, Ghana's second largest city. On the other hand, the dualization of the road has been requested from MRH, hence, it is necessary to examine carefully not only the feasibility of the project, but also the status of land acquisition and environmental impact assessment of the section in case road widening is necessary.

#### **1.4 Outcome of the preparatory survey**

With the basic principle of "Sanpo Yoshi (three-way satisfaction)", the goal of the Project is to grant a concession right through an unsolicited proposal, while structuring an optimal project financing scheme benefiting all three parties: public, private and society. The JICA Study Team has agreed with MRH/GHA that the Project is considered as an unsolicited proposal, considering the study capability of differing project structuring schemes and its ancillary projects.

The outcome of the Preparatory Survey is as follows:

##### **Optimal PPP section**

The optimal target section to maximize its project profitability (the only section without shortfall in cashflow during the whole project period) is to set the PPP section from **“Aburi – Mamfe - Koforidua” (approximately 60 km)** (previously was “Mamfe - Koforidua - Bunso (approximately 70km)”) for the implementation of concession scheme, allowing benefits to be gained from the private sector’s capability for innovation and creativity offering the optimal life cycle cost.

##### **Optimal Project Scheme**

In case of “Concession + VGF”: to reach the targeted Equity IRR of 20%, approx. 23% of the total CAPEX (at the beginning of the project period) is expected to be provided by the Viability Gap Scheme of the Government of Ghana, resulting in Project IRR of 16.18% and Equity IRR of 20.06%. In addition, it is expected that the government balance will be expected to reduce by approximately 1,232 Million Yen (approx. 11.7 Million USD) compared with public operations and maintenance, which will be financially beneficial for both the private and public sectors.

In case of “Concession (fully self-financing)”: to make the Project under concession with fully self-financing, the changes in the ratio of pavement maintenance method (pavement replacement and overlays) and the toll rate revision will be necessary to reach the targeted Equity IRR of 20% without any government subsidies such as VGF. For example, in case the toll rate is set at 4 times higher than the current toll rate with the maintenance method of 30% of pavement replacement and 70% of overlays, the Equity IRR is expected to achieve 20.14% without any government subsidies such as VGF. The validity of the revision of toll rate as well as the maintenance method ratio will be further analyzed during the Feasibility Study stage. In addition, the development of Parking Area/Service Area along the corridor with the implementation of innovative technologies

will be another potential factor to increase the project revenue, which will be included in the detailed financial analysis during the F/S. However, it is necessary to confirm the arrangements under the new PPP Act prior to the Feasible Study.

## 2. Project Site and Surrounding Environment

### 2.1 Outline of the road PPP project and sub-projects

#### (1) Road PPP Project

The main section of the Preparatory Survey “Mamfe - Koforidua - Bunso” section (“proposed section”) forms part of the inter-regional network connecting the commercially vibrant Eastern Region and the Ashanti Region, where the second largest city, Kumasi, is located. Most of the section is a two-lane toll road, with four-lane road located in Koforidua Central.

According to the Government of Ghana, the average traffic volume of Mamfe - Koforidua - Bunso in 2014 was approximately 20,000 to 25,000 vehicles per day, which is expected to continually increase in the future. The National Road 6 (N6) is a parallel toll road to N4, and N4 including the Mamfe - Koforidua - Bunso section has currently one toll booth in the Aburi area, centrally located between Accra and Mamfe.

There are several local rest-stops and communities managed by the private sector along the corridor, and N4 section from the capital city of Accra to Mamfe is globally known as a tourist site with a high future traffic potential.

Table 2-1 Outline of Mamfe - Koforidua - Bunso Project

Items	Contents	Notes
Road classification	Toll road	-
Length	Approx. 70 km	-
No. of lanes	2-lane (4-lane in Koforidua Central)	Expansion not expected nor requested
Estimated traffic volume	20,000 - 25,000 vehicles / day (2014)	Source: MRH
Toll rates	Car: 0.50 GHS (20 Yen) Light Good Trucks (2 axles): (30 Yen)	

Source: JICA Study Team

Table 2-2 Outline of Sunyani – Abuakwa Project

Items	Contents	Notes
Road classification	Toll road	-
Length	Approx. 110 km	-
No. of lanes	2-lane (some sections are 4-lane)	Expansion to 4-lane requested from MRH
Estimated traffic volume	4,000 - 5,000 vehicles / day (2015)	Source: MRH
Toll rates	Same rates applied	

Source: JICA Study Team

In the Ghana's road sector, the existing toll rates were last revised in 2010, and MRH, with a support from the World Bank, has developed a draft toll policy currently seeking approval from

the Central Government. Nonetheless, the current tolling setting is very low which will be required to adjust accordingly to ensure the bankability of the PPP Project.

(2) Sewerage/drainage and housing projects

With regard to the sewerage/drainage and housing projects, the Ministry of Works and Housing ("MWH") of Ghana has requested to seek potential business opportunities by the Japanese private sector:

Improvement of drainage system

According to MWH, although there are side drains along the corridor, flooding is a frequent issue in major cities, including Koforidua, mainly due to inadequate drainage facilities. Furthermore, the culverts along the corridor are under the responsibility MRH, and the inadequate drainage system may cause indirect damages to the road and may require rehabilitation of the drainage system to improve its road functionality.

Housing development and sewerage treatment development

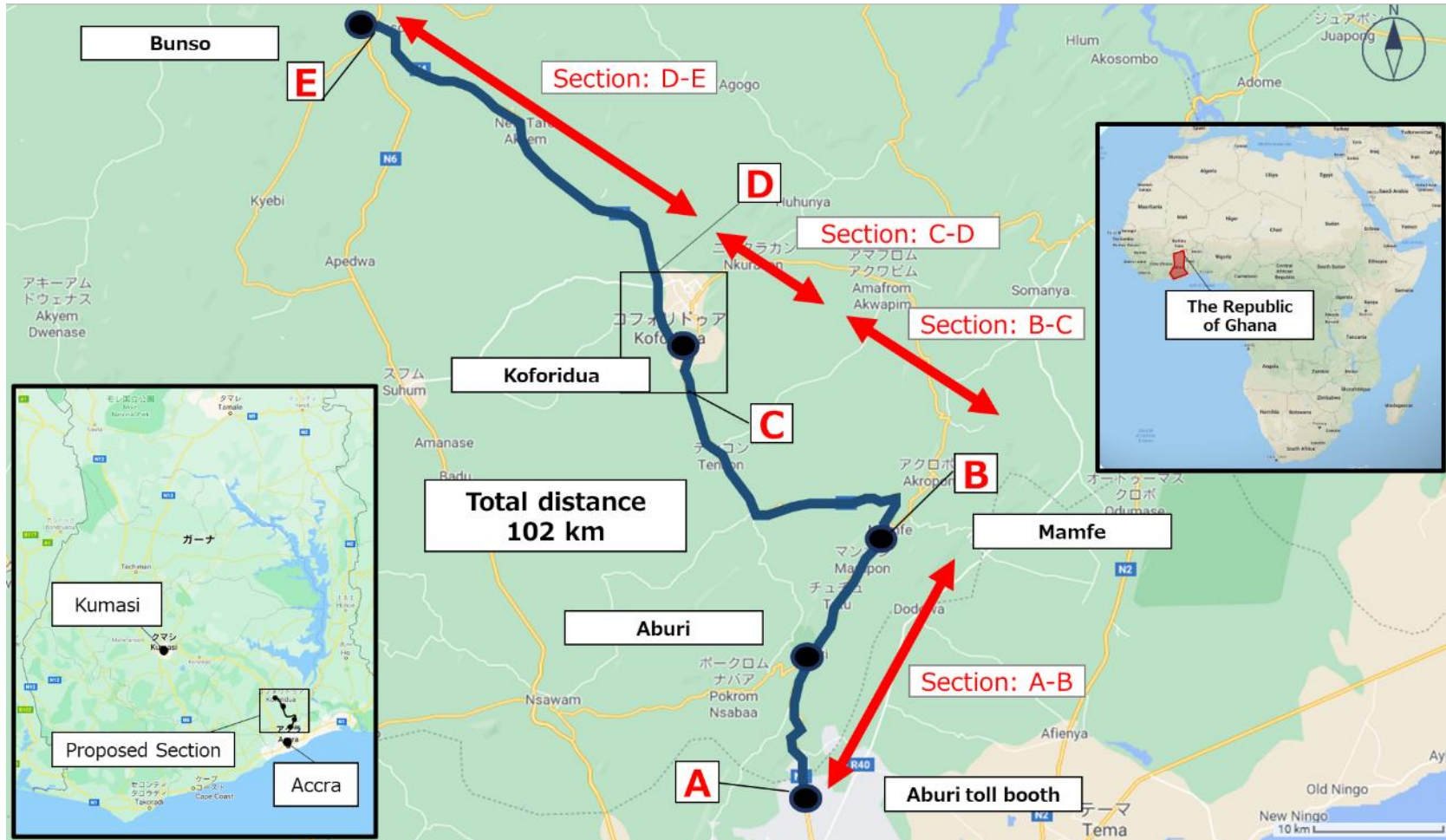
According to MWH, there is a shortage of approximately two million housing units for low-income households in Ghana, which is currently being supported by the United Nations Office of Project Services (UNOPS) as the Affordable Housing Project. The Affordable Housing Project aims to develop one million housing units in the next 10 years, with 250,000 units planned to be developed in the Ashanti Region and 50,000 units in the Eastern Region respectively.

Considering above, housing development and the installation of the sewerage treatment system will be required for the socio-economic development of Ghana, and it is requested from MWH to solve such issue with the use of cutting-edge technologies and know-how of Japanese companies. The surrounding development along the corridor may also lead to traffic increase which will generate synthetic population and employment.



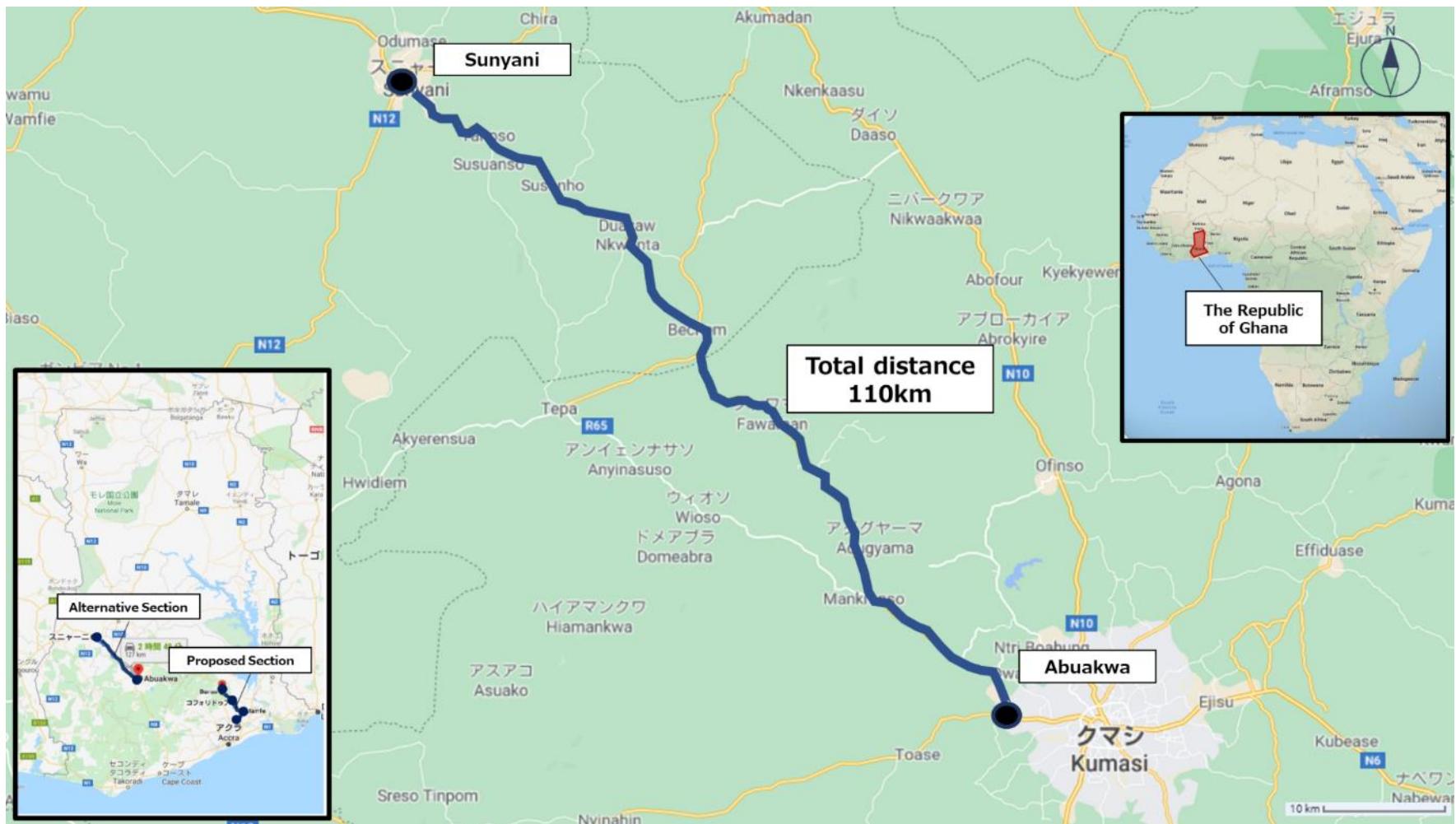
2.2 Project site and future prospects

2.2.1 Geographical locations of the Mamfe - Koforidua - Bunso (“proposed section”) and Sunyani - Abuakwa (“alternative section”)



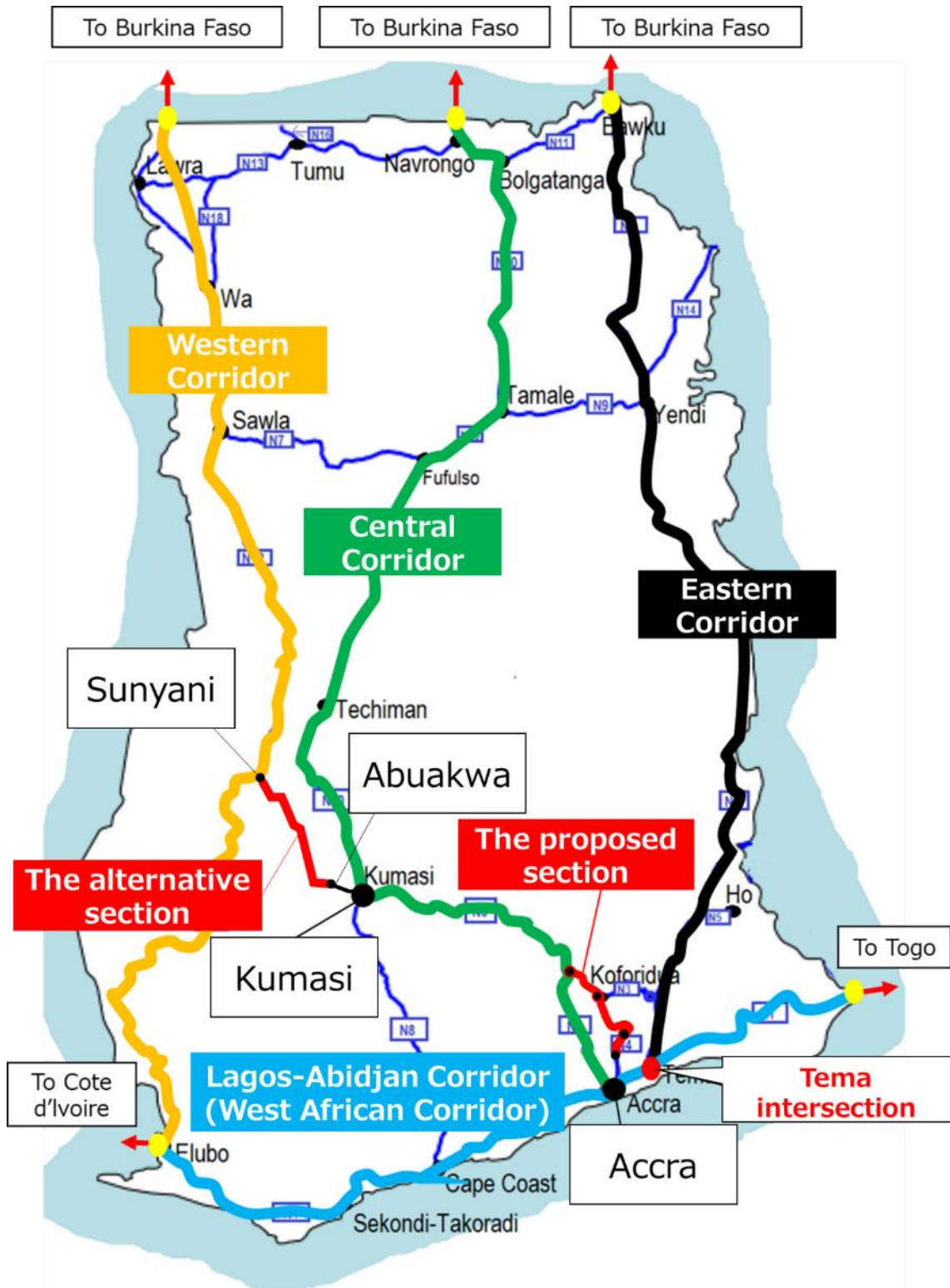
Source: JICA Study Team

Figure 2-1 Aburi – Mamfe – Koforidua - Bunso Section / Eastern and Ashanti Region



Source: JICA Study Team

Figure 2-2 Sunyani - Abuakwa Section / Brong - Ahafo Region



Source: JICA Study Team

Figure 2-3 Road Network in Ghana

### **2.2.2 Future prospects**

#### **(1) Inter-regional network**

The Mamfe - Koforidua - Bunso section along N4 is a part of inter-regional network connecting the commercially vibrant Eastern Region and the Ashanti Region, where the second largest city, Kumasi, is located. The intermediate city, Koforidua, the capital of the Eastern Region, is considered as an industrial development and transportation hub of the hinterland, and the traffic volume is expected to continually increase with potential regional development.

#### **(2) Road condition**

Currently, only 39% of the existing roads with a total of 78,000 km in Ghana are well maintained. GHA is responsible for the maintenance of the national roads, however, optimal operations and maintenance standard has not been properly implemented mainly due to government budget constraints. On the other hand, the Pavement Maintenance and Management Program (PMMP) has been introduced in recent years and will be used to monitor asset condition and allocate funds to priority sections. The necessity of rehabilitation and/or pavement of the roads will be further studied in this Preparatory Survey including its safety concerns with the current road alignment.

### **3. Technical Analysis**

#### **3.1 Proposed section (Mamfe - Koforidua - Bunso)**

##### **3.1.1 Demand forecast**

###### **(1) Present traffic volume**

Undisclosed due to confidential business information

Table 3-1 AADT on N4 (existing data)

Undisclosed due to confidential business information

Table 3-2 Traffic indicator

Undisclosed due to confidential business information

Table 3-3 Present traffic volume on the proposed section (1/2)

Undisclosed due to confidential business information

Figure 3-1 Composition by vehicle type on the proposed section

Undisclosed due to confidential business information

Table 3-4 Present traffic volume on the proposed section (2/2)

Undisclosed due to confidential business information

Figure 3-2 Number of lanes on the proposed section

Undisclosed due to confidential business information

Table 3-5 Composition ratio of taxi on the proposed section

Undisclosed due to confidential business information

Table 3-6 Composition ratio of daily traffic of N6 (actual in 2015)

Undisclosed due to confidential business information

Figure 3-3 Future road networks in Accra Metropolitan District

Undisclosed due to confidential business information

Table 3-7 Traffic growth

Undisclosed due to confidential business information

### **3.1.2 Current status of road assets**

Undisclosed due to confidential business information

Figure 3-4 Surrounding condition of proposed section

Undisclosed due to confidential business information

Figure 3-5 The elevation of Route N4 and Route N6

Undisclosed due to confidential business information

Figure 3-6 Road length and travel time of Route N4 and Route N6

Undisclosed due to confidential business information

Table 3-8 Existing toll booth around the proposed section

Undisclosed due to confidential business information

Figure 3-7 Toll booth on Route N4

Undisclosed due to confidential business information

Figure 3-8 Toll by vehicle category

Undisclosed due to confidential business information

Table 3-9 Road Conditions between Mamfe-Koforidua-Bunso

Undisclosed due to confidential business information

Figure 3-9 Condition of the road between Mamfe-Koforidua-Bunso

Undisclosed due to confidential business information

### **3.1.3 Necessity for new facilities**

Undisclosed due to confidential business information

Table 3-10 Policies of this PPP project on measures against current issues

Undisclosed due to confidential business information

Table 3-11 Issues and measures for the proposed section

Undisclosed due to confidential business information

### **3.1.4 New facilities and rehabilitation cost**

Undisclosed due to confidential business information

Table 3-12 Outline of the cost categories

Undisclosed due to confidential business information

Table 3-13 Item of initial investment

Undisclosed due to confidential business information

Table 3-14 Large scale investment

Undisclosed due to confidential business information

Table 3-15 Estimated cost of similar cases in Ghana

Undisclosed due to confidential business information

### **3.1.5 Operation and Maintenance cost (O&M cost)**

Undisclosed due to confidential business information

Table 3-16 Road Maintenance Operation Manuals Ghana Highway Authority

Undisclosed due to confidential business information

Figure 3-10 GHA Maintenance Organization Chart- Head Office

Undisclosed due to confidential business information

Figure 3-11 GHA Maintenance Organization Chart-Regional

Undisclosed due to confidential business information

Table 3-17 Employment cost and facility cost of management office and toll booths

Undisclosed due to confidential business information

Table 3-18 Maintenance of facilities (Every year)

Undisclosed due to confidential business information

Table 3-19 Maintenance of facilities (Every few years)

Undisclosed due to confidential business information



### **3.2 Alternative section (Sunyani - Abuakwa)**

Undisclosed due to confidential business information

#### **3.2.1 Current traffic volume**

Undisclosed due to confidential business information

Table 3-20 Existing traffic volume

Undisclosed due to confidential business information

#### **3.2.2 Demand forecast**

Undisclosed due to confidential business information

Table 3-21 Traffic growth rate

Undisclosed due to confidential business information

Figure 3-12 Future Traffic Volume (30 years)

Undisclosed due to confidential business information

Table 3-22 Future traffic volume (Sunyani-Abuakwa)

Undisclosed due to confidential business information

Figure 3-13 Traffic volume / Traffic capacity

Undisclosed due to confidential business information

#### **3.2.3 Current status of road assets**

Undisclosed due to confidential business information

#### **3.2.4 Necessity for new facilities**

Undisclosed due to confidential business information

#### **3.2.5 New facilities and rehabilitation cost**

Undisclosed due to confidential business information

#### **3.2.6 Operation and Maintenance cost (O&M cost)**

Undisclosed due to confidential business information

## **4. Legal Analysis**

### **4.1 Proposed section (Mamfe - Koforidua – Bunso)**

#### **4.1.1 Relevant status of road PPP projects**

Undisclosed due to confidential business information

#### **4.1.2 Legal basis for this project**

Undisclosed due to confidential business information

#### **4.1.3 Applied scheme feasibility based on related law**

Undisclosed due to confidential business information

#### **4.1.4 Possibility of unsolicited proposal and negotiated contract**

Undisclosed due to confidential business information

#### **4.1.5 Process of selecting private business operators in the case of unsolicited proposals**

Undisclosed due to confidential business information

**4.2 Alternative section (Sunyani – Abuakwa)**

Undisclosed due to confidential business information

**4.2.1 Legal basis for similar road PPP projects and their schemes**

Undisclosed due to confidential business information

**4.2.2 Legal basis for this project**

Undisclosed due to confidential business information

**4.2.3 Applicability under the relevant statutes of the schemes to the Project**

Undisclosed due to confidential business information

**4.2.4 Possibility of unsolicited proposals and negotiated contracts**

Undisclosed due to confidential business information

**4.2.5 Process of selecting private business operators for unsolicited proposal**

Undisclosed due to confidential business information

## **5. Risk Analysis**

### **5.1 Proposed section (Mamfe - Koforidua – Bunso)**

#### **5.1.1 Risk generation phase for the proposed section**

Undisclosed due to confidential business information

Figure 5-1 Risk generation phase on the road PPP project in Ghana (Proposed section)

Undisclosed due to confidential business information

#### **5.1.2 Assumed risks for each project structuring scheme**

Undisclosed due to confidential business information

Figure 5-2 Concession scheme (fully self-financing)

Undisclosed due to confidential business information

Figure 5-3 Concession + VGF scheme

Undisclosed due to confidential business information

Figure 5-4 Concession + AP scheme

Undisclosed due to confidential business information

#### **5.1.3 Common risks for the proposed and alternative sections**

Undisclosed due to confidential business information

Table 5-1 Common risk analysis for the two sections

Undisclosed due to confidential business information

#### **5.1.4 Mitigation measures for specific risks**

Undisclosed due to confidential business information

## **5.2 Alternative section (Sunyani - Abuakwa)**

Undisclosed due to confidential business information

### **5.2.1 Risk generation phase for the alternative section**

Undisclosed due to confidential business information

Figure 5-5 Risk generation phase of road PPP project in Ghana (Alternative section)

Undisclosed due to confidential business information

### **5.2.2 Common risks for the proposed and alternative sections**

Undisclosed due to confidential business information

### **5.2.3 Mitigation measures for specific risk**

Undisclosed due to confidential business information

## **6. Project Structuring**

### **6.1 Proposed section (Mamfe - Koforidua – Bunso)**

#### **6.1.1 Project structuring**

Undisclosed due to confidential business information

Table 6-1 Outline of three different project scheme options

Undisclosed due to confidential business information

Table 6-2 Estimated balance for the proposed section (Option 1)

Undisclosed due to confidential business information

Table 6-3 Estimated balance for the proposed section (Option 2)

Undisclosed due to confidential business information

Table 6-4 Estimated balance for the 4 divided sections

Undisclosed due to confidential business information

#### **6.1.2 Roles of public and private sectors**

Undisclosed due to confidential business information

Table 6-5 Sharing of roles between the government and Private Sector in the proposed section

Undisclosed due to confidential business information

Table 6-6 Public and private roles in “Option 3: Concession + Availability Payment”

Undisclosed due to confidential business information

#### **6.1.3 Project structuring scheme**

Undisclosed due to confidential business information

Table 6-7 Summary of three different options in the proposed section

Undisclosed due to confidential business information

**6.2 Alternative section (Sunyani - Abuakwa)**

**6.2.1 Project structuring**

Undisclosed due to confidential business information

Table 6-8 Estimated balance of alternative section (Option 1)

Undisclosed due to confidential business information

**6.2.2 Roles of public and private sectors**

Undisclosed due to confidential business information

**6.2.3 Project structuring scheme**

Undisclosed due to confidential business information

Table 6-9 Summary of the three different options for the alternative section

Undisclosed due to confidential business information

## **7. Economic and Financial Analysis**

Undisclosed due to confidential business information

Table 7-1 Common Pre-conditions for the evaluation

Undisclosed due to confidential business information

### **7.1 Economic analysis**

Undisclosed due to confidential business information

#### **7.1.1 Economic cost**

Undisclosed due to confidential business information

Table 7-2 Project cost

Undisclosed due to confidential business information

Table 7-3 O&M cost

Undisclosed due to confidential business information

#### **7.1.2 Economic benefits**

Undisclosed due to confidential business information

Table 7-4 Vehicle Operating Cost

Undisclosed due to confidential business information

Table 7-5 The outcomes of the economic benefits

Undisclosed due to confidential business information

#### **7.1.3 Consideration of Economic Analysis**

Undisclosed due to confidential business information

Table 7-6 The outcome of economic analysis

Undisclosed due to confidential business information



## **7.2 Financial Analysis**

### **7.2.1 Pre-condition for Financial Analysis**

Undisclosed due to confidential business information

Table 7-7 Construction Cost

Undisclosed due to confidential business information

Table 7-8 O&M Cost

Undisclosed due to confidential business information

Table 7-9 Toll Revenue

Undisclosed due to confidential business information

Table 7-10 VGF ratio by each section scenario

Undisclosed due to confidential business information

## **7.3 Cash flow analysis**

Undisclosed due to confidential business information

### **7.3.1 ① Mamfe-Koforidua-Bunso Section**

Undisclosed due to confidential business information

Table 7-11 The outcome of financial analysis (Concession + VGF scheme)

Undisclosed due to confidential business information

Table 7-12 Cash Flow Table (Concession + VGF scheme)

Undisclosed due to confidential business information

Table 7-13 Revenue and Expenditure of Government

Undisclosed due to confidential business information

### **7.3.2 ② Aburi-Mamfe-Koforidua-Bunso Section**

Undisclosed due to confidential business information

Table 7-14 The outcome of financial analysis (Concession + VGF scheme)

Undisclosed due to confidential business information

Table 7-15 Cash Flow Table (Concession + VGF scheme)

Undisclosed due to confidential business information

Table 7-16 Revenue and Expenditure of Government

Undisclosed due to confidential business information

### **7.3.3 ③ Aburi-Mamfe-Koforidua Section**

Undisclosed due to confidential business information

Table 7-17 The outcomes of Financial Analysis (Concession + VGF scheme)

Undisclosed due to confidential business information

Table 7-18 Cash Flow Table (Concession + VGF scheme)

Undisclosed due to confidential business information

Table 7-19 Revenue and Expenditure of Government

Undisclosed due to confidential business information

## **7.4 Sensitivity Analysis**

Undisclosed due to confidential business information

### **7.4.1 Sensitivity analysis with changes in maintenance method**

Undisclosed due to confidential business information

### **7.4.2 Sensitivity analysis with changes in investment schedule**

Undisclosed due to confidential business information

### **7.4.3 Sensitivity analysis with changes in maintenance cost**

Undisclosed due to confidential business information

Table 7-20 OPEX Reduction Sensitivity Analysis of Equity IRR

Undisclosed due to confidential business information

**7.4.4 Sensitivity Analysis with changes in toll rates of the Aburi - Mamfe section**

Undisclosed due to confidential business information

Table 7-21 Sensitivity Analysis of Equity IRR by toll rate at Aburi - Mamfe section

Undisclosed due to confidential business information

**7.4.5 Consideration of Sensitivity Analysis**

Undisclosed due to confidential business information

## **8. Financing Plan**

### **8.1 Finance trend in Ghana**

Undisclosed due to confidential business information

Table 8-1 Project Finance for PPP Project in Ghana

Undisclosed due to confidential business information

#### **8.1.1 Assumed financing scheme**

Undisclosed due to confidential business information

Table 8-2 Terms and Conditions for JICA's private sector investment finance

Undisclosed due to confidential business information

## 9. Environmental and Social Consideration

### 9.1 Proposed section (Mamfe – Koforidua - Bunso)

As the applicable environmental categories may differ between the proposed section (Mamfe – Koforidua - Bunso) and the alternative section (Sunyani - Abuakwa), environmental and social consideration will be conducted taking into account the characteristics of each section.

Table 9-1 Comparison and evaluation of the two sections

Item	Mamfe - Koforidua - Bunso	Sunyani-Abuakwa
Road type	Toll road	Toll road
Route extension	Approx. 70km	Approx. 110 km
Number of cross-sectional lanes	2 lanes (4 lanes in Koforidua Central) *No plan for widening or extension	2 lanes (some sections are 3-4 lanes) *4-lane widening is requested by GoG
Road structure	embankment	embankment
Traffic Volume	Approx. 20,000 to 25,000 vehicles/day (2014) <sup>2</sup>	Approx. 4,166 vehicles/day (2015) <sup>3</sup>
Toll rate	cars: 0.50GHS (Approx. 20 yen) Light Truck (2 axles): 1.50GHS (Approx. 30 yen)	same rate applied
Category	Category “B”	Category “A”
Resettlement/land acquisition	No resettlement nor land acquisition will be required; however, depending on the location of new toll booths, there may be a possibility of small-scale resettlement and/or land acquisition	There may be a possibility of resettlement and land acquisition required in case of 4-lane expansion construction
Impact on the natural environment	No potential impact on the natural environment	There may be a possible impact on the natural environment in case of 4-lane expansion construction
Impact on socio-economic activities and regional development	No potential impact on socio-economic activities and regional development	In case of 4-lane expansion construction, smooth and safe traffic will be disrupted, and socio-economic activities may be hampered, however, upon completion of construction, socio-economic activities and the development of the project site will be promoted.

Source: JICA Study Team

<sup>2</sup> Source: The Ministry of Roads and Highways in Ghana

<sup>3</sup> Source: PRIORITIZED ROADS AND BRIDGES PROJECTS FOR INVESTMENT, 2017, MRH

### 9.1.1 Screening outline

Screening outline in the proposed section (Mamfe - Koforidua - Bunso) is showed below.

Question 1: Address of project site

See 2.2.1 above.

Question 2: Scale and contents of the project (e.g., approximate, facilities area, production, electricity generated, etc.)

2-1 Project profile (scale and contents)

See 2.1 above.

2-2 The necessity of the project

The proposed section (Mamfe Koforidua – Bunso) is identified as a priority road project in the MRH publication “Prioritized Roads and Bridge for Investment, MRH, 2017”, which is consistent with the Master Plan of Ghana.

2-3 Consideration of alternatives

The alternative section “Sunyani-Abuakwa section” in the Preparatory Survey is considered as a comparable section based on environmental and social considerations to the extent possible.

2-4 Consultation with stakeholders

Mutual discussions have been made with the relevant ministries and agencies (MRH/GHA) based on the impact of environmental and social considerations and the need to acquire the land for the project. According to MRH, if it becomes necessary to acquire the land for the project, it will need to be considered during the Feasibility Study (F/S) phase.

Question 3: New/ongoing projects

The main scope in the proposed section is the operation and management of the current toll road, hence, it will be considered as an on-going project although service area/parking area development ("SA/PA development") may be considered as ancillary projects.

Question 4: Necessity of environmental assessment (EIA, IEE, etc.)

The environmental assessment is required by the legal frameworks in Ghana; hence, it will be considered in detail during the F/S stage. The following official documents have been published by the Government of Ghana and will need to be taken into account with JICA’s guidelines during the assessment.

1. Environmental and Social Management Framework, MRH, 2017

## 2. MRH Resettlement Policy Framework, MRH, 2017

### Question 5: Environmental assessment

See above.

### Question 6: Requires certificate and approvals for environmental and society other than an EIA

During the environment assessment at F/S stage, any requirement of certificate and approvals for environmental and society other than an EIA will be identified based on the published documents as per mentioned above.

### Question 7: Any protection areas designated by the government

Based on the existing data, there are currently no protection areas designated by the government inside the project site. Detailed examination is required during the F/S.

### Question 8: Any involuntary resettlement, groundwater pumping, land development etc.

The need for large-scale involuntary resettlement, groundwater pumping and land development etc. in the proposed section is not envisioned at this time. However, depending on the location of new toll booths (especially within Koforidua), there may be a requirement of small-scale resettlement.

### Question 9: Possibility of undesirable effects on the environmental and social impacts

As the main scope is the operation and management of the current toll road, as described above, it is not expected that the project will have an undesirable impact on the environment and society at this time.

### Question 10: Any specific sub-projects in the case of a loan project such as a two-step loan or a sector loan

The project is not considering the use of JICA's ODA Loan at this moment. JICA's Private Sector Investment Finance is under consideration.

### Question 11: Information disclosure and meetings with local stakeholders

If environmental and social considerations are required in the proposed section, information disclosure and meetings with local stakeholders will be conducted at the F/S stage, in accordance with the Guidelines for Environmental and Social Considerations issued by the Japan International Cooperation Agency and the Government of Ghana.

### 9.1.2 Checklist outline

The environmental checklist for the proposed section (Mamfe – Koforidua - Bunso) is attached below.

Table 9-2 Environmental Checklist

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a) The EIA report will be prepared at the F/S stage.  (b)(c) In case of no revisions required for the EIA report prepared at the F/S stage, it will be approved within 50 days of submission. (d) It is assumed that approval procedures for environments other than EIA are not necessary at this time, however, detailed examination will be conducted at the F/S stage.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) N (b) N	(a)(b) It will be conducted at the F/S stage.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Multiple alternatives, including environmental and social considerations, have been studied in this Preparatory Survey for both proposed and alternative sections.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that air pollutants emitted from the project related sources, such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating	(a) - (b) -	(a)(b) The proposed section site is located in an agricultural/industrial area and does not have a large number of passing vehicles, hence, the impact of air pollutants is relatively minor. However, air monitoring has not been



Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		measures taken? (b) Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?		conducted and it is not known if environmental standards are exceeded.
	(2) Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? (c) Do effluents from various facilities, such as parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas not to comply with the country's ambient water quality standards?	(a) N (b) N (c) N	(a) The main scope is operation and maintenance of the current toll road, which does not involve construction work, etc., therefore, there is no risk of degradation of water quality in the downstream area. (b) There is currently no impact on the water source as the drainage channel is maintained along the corridor. (c) There is currently no construction of new facilities, however, if parking areas/service areas are to be constructed, the compliance with the country's effluent standards and ambient water quality standards will be studied at the F/S stage.
	(3) Wastes	(a) Are wastes generated from the project facilities, such as parking areas/service areas, properly treated and disposed of in accordance with the country's regulations?	(a) N	(a) Construction of parking/service areas, etc. is not included at the Preparatory Survey stage.
	(4) Noise and vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards?	(a) N	(a) Currently, there is no information that the noise and vibrations from the passing vehicles exceed environmental standards. There may be a possibility that the noise may increase with future increase in traffic, however, the site is located in an agricultural/industrial area, therefore, it is not considered to have a serious impact on the local residents.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will	(a) N	(a) The project site is not located in protected areas designated by the government of Ghana.

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		affect the protected areas?		
	(2) Ecosystem	<p>(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?</p> <p>(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?</p> <p>(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock?</p> <p>(e) Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic (nonnative invasive) species and pests? Are adequate measures for preventing such impacts considered?</p> <p>(f) In cases the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?</p>	<p>(a) N (b) N (c) N (d) N (e) N (f) N</p>	<p>(a) No primeval forests, tropical rain forests nor ecologically valuable habitats at the project site.</p> <p>(b) No protected habitats of endangered species at the project site.</p> <p>(c)(d) No significant ecological impacts.</p> <p>(e)(f) The project main scope is operation and maintenance of the existing toll roads and there is no plan of construction of new roads, hence, there will be no destruction of forest, poaching, desertification, reduction in wetland areas and disturbance of ecosystems.</p>
	(3) Hydrology	(a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	(a) N	(a) There is no major terrain alteration or tunnel construction planned at this time.
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are	<p>(a) N (b) N (c) N</p>	(a)(b) While construction work may include small-scale filling and cutting of earthworks, it is

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		<p>adequate measures considered to prevent slope failures or landslides, where needed?</p> <p>(b) Is there a possibility that civil works, such as cutting, and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides?</p> <p>(c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?</p>		<p>assumed that the site does not have steep slopes that will result in soil failures or landslides.</p> <p>(c) Accidents will be prevented if proper filling and cuttings are made.</p>
4 Social Environment	(1) Resettlement	<p>(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?</p> <p>(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?</p> <p>(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?</p> <p>(d) Are the compensations going to be paid prior to the resettlement?</p> <p>(e) Are the compensation policies prepared in document?</p> <p>(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>(g) Are agreements with the affected people obtained prior to resettlement?</p> <p>(h) Is the organizational framework established to properly implement</p>	<p>(a) N (b) N (c) N (d) N (e) N (f) N (g) N (h) N (i) N (j) N</p>	<p>(a)(b)(c)(d)(e)(f)(g)(h)(i)(j) The project main scope is operation and maintenance of the existing toll roads and there is no plan of construction of new roads, hence, no resettlement is expected to occur. However, depending on the location of new toll booths (especially within Koforidua), there may be a requirement of small-scale resettlement.,</p>

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		<p>resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p>		
	(2) Living and Livelihood	<p>(a) Where roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts?</p> <p>(b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>(c) Is there any possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?</p> <p>(d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)?</p> <p>(e) Is there any possibility that roads will impede the movement of inhabitants?</p> <p>(f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?</p>	<p>(a) N (b) N (c) N (d) N (e) N (f) N</p>	<p>(a)(b)(c)(d)(e)(f) The project main scope is operation and maintenance of the existing toll roads; hence, it will not cause significant adverse impacts in sources of livelihood and road traffic in surrounding areas. However, depending on the location of new toll booths (especially within Koforidua), there may be a requirement of small-scale resettlement which may affect the living conditions of the inhabitants.</p>

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) The project will not damage the local archeological, historical, cultural, and religious heritage.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) Currently, there is no possibility that the project will adversely affect the local landscape.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(a) N (b) N	(a)(b) The site is not an area inhabited by ethnic minorities nor indigenous peoples.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or	(a)Y (b)Y (c)Y (d)Y	(a) The proponent complies with the working conditions of Ghana. (b) During construction, the proponent will take appropriate safety measures to prevent industrial accidents. (c)(d) Before construction, safety training for workers and consideration for local residents in the environmental management plan will be planned and implemented.

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		local residents?		
5 Others	(1) Impacts during Construction	<p>(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?</p> <p>(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?</p> <p>(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p>	<p>(a) In case of construction (e.g., toll booths), adequate measures, including construction management plan, will be prepared to reduce impacts during construction.</p> <p>(b) The construction activities do not have adverse impacts on the natural environment.</p> <p>(c) In case of construction (e.g., toll booths), adequate measures to reduce impacts will be included in the construction management plan.</p>
	(2) Monitoring	<p>(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?</p> <p>(b) What are the items, methods and frequencies of the monitoring program?</p> <p>(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?</p> <p>(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p> <p>(d) Y</p>	<p>(a) Following the preparation of the EIA report at the FS stage, the monitoring program will be developed and implemented.</p> <p>(b)(c)(d) The specific monitoring framework has not been established as the EIA report will be prepared at the FS stage.</p>
6 Note	Reference to Checklist of Other Sectors	<p>(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation).</p> <p>(b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or</p>	<p>(a) N</p> <p>(b) N</p>	<p>(a) There will be no deforestation at the project site.</p> <p>(b) There will be no transmission nor distribution line at the project site.</p>

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		electric distribution facilities).		
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N	(a) There will be no impacts to transboundary or global issues.

Source: JICA Study Team

1) Regarding the term “Country's Standards” mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made. In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

### 9.1.3 Necessity of land acquisition and resettlement

Currently, it is assumed that land acquisition is not necessary for the proposed section as the main scope is the operation and maintenance of the existing toll road. However, there may be a possibility of small-scale resettlement depending on the location of construction of new toll booths. In addition, as mentioned in 9.1.1 above, if land acquisition or resettlement becomes necessary due to the construction of a new SA/PA as part of the ancillary project, it is agreed with MRH that a detailed study will be conducted at the Feasibility Study stage.

## **9.2 Alternative section (Sunyani -Abuakwa)**

### **9.2.1 Screening outline**

Screening outline in the alternative section (Sunyani - Abuakwa) is shown below.

Question 1: Address of project site

Same as 9.1.1

Question 2: Scale and contents of the project (e.g., approximate area, facilities area, production, electricity generated, etc.)

2-1 Project profile (scale and contents)

Same as 9.1.1

2-2 The necessity of the project

Same as 9.1.1

2-3 Consideration of alternatives

As mentioned in 9.1.1, in this Preparatory Survey, 2 potential sections, the proposed section and the alternative section, have been considered as the comparable sections based on environmental and social considerations to the extent possible.

2-4 Consultation with stakeholders

Same as 9.1.1

Question 3: New/ongoing projects

In this alternative section, although the main project is the operation and management of the ongoing toll road, there is a request from MRH for the widening to 4-lane, which may require construction of new toll roads.

Question 4: Necessity of environmental assessment (EIA, IEE, etc.)

Same as 9.1.1

Question 5: Environmental assessment

Same as 9.1.1

Question 6: Requires certificate and approvals for environmental and society other than an EIA

Same as 9.1.1



Question 7: Any protection areas designated by the government

Same as 9.1.1

Question 8: Any involuntary resettlement, groundwater pumping, land development etc.

Same as 9.1.1

Question 9: Possibility of undesirable effects on the environmental and social impacts

Although basically the same as described in 9.1.1 above, the possibility of the impact of environmental and social considerations will be examined in detail at the Feasibility Study stage, in case of 4-lane widening work is necessary.

Question 10: Any specific sub-projects in the case of a loan project such as a two-step loan or a sector loan

Same as 9.1.1

Question 11: Information disclosure and discussion with local stakeholders

Same as 9.1.1

### 9.2.2 Checklist outline (Land acquisition)

The environmental checklist for the alternative section (Sunyani - Abuakwa) is attached below.

Table 9-3 Environmental Checklist

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N (d) N	(a)(b)(c)(d) same as 9.1.2

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) N (b) N	(a)(b) same as 9.1.2
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) same as 9.1.2
2 Pollution control measures	(1) Air Quality	(a) Is there a possibility that air pollutants emitted from the project related sources, such as vehicles traffic will affect ambient air quality? Does ambient air quality comply with the country's air quality standards? Are any mitigating measures taken? (b) Where industrial areas already exist near the route, is there a possibility that the project will make air pollution worse?	(a) - (b) -	(a)(b) same as 9.1.2
	(2) Water Quality	(a) Is there a possibility that soil runoff from the bare lands resulting from earthmoving activities, such as cutting, and filling will cause water quality degradation in downstream water areas? (b) Is there a possibility that surface runoff from roads will contaminate water sources, such as groundwater? (c) Do effluents from various facilities, such as parking areas/service areas comply with the country's effluent standards and ambient water quality standards? Is there a possibility that the effluents will cause areas not to comply with the	(a) N (b) N (c) N	(a)The main scope of the alternative section is the operation and maintenance of the current toll road, however, in case a widening work is necessary, a detailed study will be needed at the F/S stage to determine the risk of degrading the water quality of the downstream waters. (b) same as 9.1.2 (c) the compliance with the country's effluent standards and ambient water quality standards will be studied at the F/S stage.

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		country's ambient water quality standards?		
	(3) Wastes	(a) Are wastes generated from the project facilities, such as parking areas/service areas, properly treated and disposed of in accordance with the country's regulations?	(a) N	(a) same as 9.1.2
	(4) Noise and Vibration	(a) Do noise and vibrations from the vehicle and train traffic comply with the country's standards?	(a) N	(a) same as 9.1.2
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) same as 9.1.2
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Are adequate protection measures taken to prevent impacts, such as disruption of migration routes, habitat fragmentation, and traffic accident of wildlife and livestock? (e) Is there a possibility that installation of roads will cause impacts, such as destruction of forest, poaching, desertification, reduction in wetland areas, and disturbance of ecosystems due to introduction of exotic	(a) N (b) N (c) N (d) N (e) N (f) N	(a)(b)(c) same as 9.1.2 (e)(f) The project main scope of the alternative section is operation and maintenance of the existing toll roads, however, in case a widening work is necessary, risk measures will be prepared to prevent deforestation and poaching associated with the project during the F/S stage.

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		(nonnative invasive) species and pests? Are adequate measures for preventing such impacts considered? (f) In cases the project site is located at undeveloped areas, is there a possibility that the new development will result in extensive loss of natural environments?		
	(3) Hydrology	(a) Is there a possibility that alteration of topographic features and installation of structures, such as tunnels will adversely affect surface water and groundwater flows?	(a) N	(a) same as 9.1.2
	(4) Topography and Geology	(a) Is there any soft ground on the route that may cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides, where needed? (b) Is there a possibility that civil works, such as cutting, and filling will cause slope failures or landslides? Are adequate measures considered to prevent slope failures or landslides? (c) Is there a possibility that soil runoff will result from cut and fill areas, waste soil disposal sites, and borrow sites? Are adequate measures taken to prevent soil runoff?	(a) N (b) N (c) N	(a)(b)(c) same as 9.1.2
4 Social environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies	(a) N (b) N (c) N (d) N (e) N (f) N (g) N (h) N (i) N (j) N	(a)(b)(c)(d)(e)(f)(g)(h)(i)(j) The project main scope of the alternative section is operation and maintenance of the existing toll roads, however, in case a widening work is necessary, the need and measures for resettlement associated with the project will be considered during the F/S stage.

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		<p>on resettlement?</p> <p>(d) Are the compensations going to be paid prior to the resettlement?</p> <p>(e) Are the compensation policies prepared in document?</p> <p>(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>(g) Are agreements with the affected people obtained prior to resettlement?</p> <p>(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p>		
	(2) Living and Livelihood	<p>(a) Where roads are newly installed, is there a possibility that the project will affect the existing means of transportation and the associated workers? Is there a possibility that the project will cause significant impacts, such as extensive alteration of existing land uses, changes in sources of livelihood, or unemployment? Are adequate measures considered for preventing these impacts?</p> <p>(b) Is there any possibility that the project will adversely affect the living conditions of the inhabitants other than the target population? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>(c) Is there any possibility that diseases, including infectious diseases, such as HIV will be</p>	<p>(a) N (b) N (c) N (d) N (e) N (f) N</p>	<p>(a)(b)(c)(d)(e)(f) The project main scope of the alternative section is operation and maintenance of the existing toll roads, however, measures and plans will be considered to ensure that the project will not cause significant changes in the sources of livelihood or road traffic in surrounding areas during the F/S stage.</p>

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		<p>brought due to immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?</p> <p>(d) Is there any possibility that the project will adversely affect road traffic in the surrounding areas (e.g., increase of traffic congestion and traffic accidents)?</p> <p>(e) Is there any possibility that roads will impede the movement of inhabitants?</p> <p>(f) Is there any possibility that structures associated with roads (such as bridges) will cause a sun shading and radio interference?</p>		
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) same as 9.1.2
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) same as 9.1.2
	(5) Ethnic Minorities and Indigenous Peoples	<p>(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?</p> <p>(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?</p>	(a) N (b) N	(a)(b) same as 9.1.2
	(6) Working Conditions	<p>(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?</p> <p>(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation</p>	(a)Y (b)Y (c)Y (d)Y	(a)(b)(c)(d) same as 9.1.2

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		<p>of safety equipment which prevents industrial accidents, and management of hazardous materials?</p> <p>(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?</p> <p>(d) Are appropriate measures being taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?</p>		
5 Others	(1) Impacts during Construction	<p>(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?</p> <p>(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?</p> <p>(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p>	(a)(b)(c) same as 9.1.2
	(2) Monitoring	<p>(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?</p> <p>(b) What are the items, methods and frequencies of the monitoring program?</p> <p>(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?</p> <p>(d) Are any regulatory requirements pertaining to the monitoring report system</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p> <p>(d) Y</p>	(a)(b)(c)(d) same as 9.1.2

Category	Environmental items	Main check items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
		identified, such as the format and frequency of reports from the proponent to the regulatory authorities?		
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects including large areas of deforestation). (b) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of power transmission lines and/or electric distribution facilities).	(a) N (b) N	(a)(b) In case a widening work is necessary, the presence or absence of relevant checks on forestry and power distribution will be checked at the F/S stage.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N	(a) same as 9.1.2

1) Regarding the term “Country's Standards” mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made. In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which it is located.

### 9.2.3 Necessity of land acquisition and resettlement

As for the alternative section, it is assumed that land acquisition is currently not necessary as the main scope is the operation and maintenance of the existing toll road. MRH has requested the widening to 4-lane along the corridor, however, as mentioned in 3.2.2 above, the widening to 4-lane will not be necessary during the PPP project period (without dividing into sub-sections). Nonetheless, in case the alternative section will be included in the PPP section of the Project, the necessity of land acquisition and resettlement will be studied during the F/S stage.



## **10. Detailed Technical Analysis for the Proposed Section (Mamfe - Koforidua - Bunso)**

### **10.1 Demand forecast for proposed section**

Undisclosed due to confidential business information

Figure 10-1 Future traffic volume (30 years)

Undisclosed due to confidential business information

Table 10-1 Future traffic between Mamfe and Koforidua (2-lane section)

Undisclosed due to confidential business information

Table 10-2 Future traffic between Koforidua and Bunso (2-lane section)

Undisclosed due to confidential business information

Table 10-3 Future traffic in Koforidua (4-lane section)

Undisclosed due to confidential business information

Table 10-4 Traffic capacity

Undisclosed due to confidential business information

Figure 10-2 Volume / capacity

Undisclosed due to confidential business information

Figure 10-3 Alternative route to the PPP toll road

Undisclosed due to confidential business information

Table 10-5 Value time employed

Undisclosed due to confidential business information

Table 10-6 Upper toll limit

Undisclosed due to confidential business information

Table 10-7 Upper limit amount by vehicle type

Undisclosed due to confidential business information

Table 10-8 Future traffic for toll road in 2040

Undisclosed due to confidential business information

Table 10-9 Tolling

Undisclosed due to confidential business information

Table 10-10 Future traffic (to maximize toll collection)

Undisclosed due to confidential business information

## **10.2 Further study on road assets**

Undisclosed due to confidential business information

Table 10-11 The road assets condition

Undisclosed due to confidential business information

## **10.3 Policy for installation of new facilities and rehabilitation**

Undisclosed due to confidential business information

Figure 10-4 The type and period of three intersections improvement in Koforidua

Undisclosed due to confidential business information

## **10.4 Cost of facilities to be newly constructed**

Undisclosed due to confidential business information

## **10.5 Operation and maintenance cost**

Undisclosed due to confidential business information

## **10.6 Investment plan**

Undisclosed due to confidential business information

Table 10-12 Example of Investment plan - Mamfe – Koforidua – Bunso section

Undisclosed due to confidential business information

Table 10-13 Example of Investment plan - Mamfe – Koforidua, 2-lane section

Undisclosed due to confidential business information

Table 10-14 Example of Investment plan - Koforidua, 4-lane section

Undisclosed due to confidential business information

Table 10-15 Example of Investment plan - Koforidua,-Bunso, 2-lane section

Undisclosed due to confidential business information

### **10.7 Extension of the target road**

Undisclosed due to confidential business information

Table 10-16 Tolling

Undisclosed due to confidential business information

Table 10-17 Future traffic (Aburi – Mamfe)

Undisclosed due to confidential business information

Table 10-18 Project cost estimate for extension section

Undisclosed due to confidential business information

Table 10-19 Example of Investment plan Mamfe – Aburi toll booths

Undisclosed due to confidential business information

## **11. Detailed Risk Analysis for the Proposed Section (Mamfe - Koforidua - Bunso)**

### **11.1 Strategic risk analysis**

#### **11.1.1 Demand risk**

Undisclosed due to confidential business information

#### **11.1.2 Inflation risk**

Undisclosed due to confidential business information

#### **11.1.3 Currency convertibility risk**

Undisclosed due to confidential business information

#### **11.1.4 Country or Political risk**

Undisclosed due to confidential business information

#### **11.1.5 Pavement damage risk**

Undisclosed due to confidential business information

#### **11.1.6 Congestion risk**

Undisclosed due to confidential business information

### **11.2 Possibility of government guarantee**

Undisclosed due to confidential business information

## **12. Detailed Project Structuring Analysis for the Proposed Section (Mamfe – Koforidua - Bunso)**

### **12.1 Optimal road PPP section and project structuring scheme**

Undisclosed due to confidential business information

### **12.2 Specification of governmental contractor**

Undisclosed due to confidential business information

### **12.3 Study on EPC contractors and O&M companies**

Undisclosed due to confidential business information

### **12.4 Organizing issues for consortium formation**

Undisclosed due to confidential business information

## **13. The Progress of Procedures within the Government of Ghana**

### **13.1 At the beginning of the study**

According to MRH, MRH has confirmed that they will submit a concept note to MOF for the registration procedure after the acceptance of the Inception Report. Although MRH/GHA is the main governmental body, it is important to share relevant information and build a strong cooperation with different stakeholders during the F/S.

### **13.2 At the end of the study**

Through this Project, the most appropriate project scheme for the public, private and the society has been analyzed, and the contents of the joint meetings between the proponents and professional consulting teams have been compiled into a monthly status report, which has been shared at the end of each month with MRH and GHA. Through this Preparatory Survey, the optimal project scheme will be presented to the relevant government agencies in order to build a consensus to proceed to F/S.

## **14. Sub-Projects (Sewage / Drainage and Housing)**

### **14.1 Possibility of sub-projects**

#### **14.1.1 Needs and necessity from the Government of Ghana**

Undisclosed due to confidential business information

#### **14.1.2 Project site**

Undisclosed due to confidential business information

#### **14.1.3 Beneficiary analysis**

Undisclosed due to confidential business information

### **14.2 Needs for drainage and sewage treatment facilities**

#### **14.2.1 Needs for drainage facilities**

Undisclosed due to confidential business information

#### **14.2.2 Needs for sewage treatment facilities**

Undisclosed due to confidential business information

Table 14-1 Community category for the water supply and sewage projects

Undisclosed due to confidential business information

### **14.3 Needs for housing development**

Undisclosed due to confidential business information

### **14.4 Development of Parking area / Service area**

Undisclosed due to confidential business information

Figure 14-1 Rest stop area along the proposed section

Undisclosed due to confidential business information

#### **14.4.1 Overview of rest stops in the proposed section**

Undisclosed due to confidential business information

#### **14.5 Relevance to road PPP project**

Undisclosed due to confidential business information

Figure 14-2 Before-and-After of Agui Parking Area in Aichi Concession in Japan

Undisclosed due to confidential business information