

# Evaluation Design Report: Liberia Roads Project

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# Liberia Roads Project

## Evaluation Design Report

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This report was prepared by International Development Group LLC (IDG) with the following contributors: Jens Abraham, Hyosun Bae, Eddy Bynens, Oana Mermeze, Prabha Pratyaksa, Daniela Rink, Jaya Chandra Vasu.

### **DISCLAIMER**

*The views and opinions expressed herein are those of the authors and do not necessarily represent those of MCC or any other U.S. Government entity.*

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## **LIST OF ACRONYMS**

AADT	Annual Average Daily Traffic
ADB	Asian Development Bank
AfDB	African Development Bank
BAH	Booz Allen Hamilton
CA	Critical Assumptions
CAPI	Computer-Assisted Personal Interviewing
CBA	Cost Benefit Analysis
COVID-19	Coronavirus Disease 2019
CP	Conditions Precedent
DC	Data Collection
DOT	Department Of Transportation
EA	Evaluation Area
EDR	Evaluation Design Report
EIRR/ERR	Economic (Internal) Rate Of Return
EMC	Evaluation Management Committee
EQ	Evaluation Question
EU	European Union
FMIS	Financial Management Information Systems
FY	Fiscal Year
GIS	Geographic Information System
GIZ	German Agency for International Cooperation
GOL	Government of Liberia
HDM-4	Highway Development and Management 4
ICDU	Implementation Coordination and Development Unit
IDG	International Development Group LLC
IIU	Infrastructure Implementation Unit
IM	Investment Memorandum
IMSC	Inter-Ministerial Steering Committee
IRB	Institutional Review Board
IRI	International Roughness Index
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
LISGIS	Liberia Institute for Statistics and Geo-Information Systems
LRRC	Liberia Renaissance Construction Company
MCA-L	Millennium Challenge Account-Liberia
MCC	Millennium Challenge Corporation
MoFDP	Ministry of Finance and Development Planning
MoT	Ministry of Transport
MPW	Ministry of Public Works
NMRMP	National Medium-Term Road Maintenance Plan
NPV	Net Present Value
NRF	National Road Fund

OCAT	Organizational Capacity Assessment Tool
O-D	Origin-Destination
OPRC	Output- And Performance-Based Road Contracts
PAPD	Pro-Poor Agenda for Prosperity and Development
PCI	Pavement Condition Index
PEA	Political Economic Analysis
PSIP	Public Sector Investment Projects
PTU	Public Transport User
RAMS	Road Asset Management System
RFA	Road Fund Administration
RMC	Regional Maintenance Center
RMMU	Road Maintenance Management Unit
RMP	Road Maintenance Program/Plan
ROMAPS	Road Maintenance Planning System
SIDA	Swedish International Development Cooperation Agency
SMP	Stella Maris Polytechnic University
TA	Technical Assistance
TBD	To Be Developed
TOR	Terms of Reference
TT	Travel Time
USAID	United States Agency for International Development
VOCs	Vehicle Operating Costs

# I. INTRODUCTION

## I.1 COUNTRY CONTEXT

The Millennium Challenge Corporation (MCC) and the Government of Liberia (GOL) signed a \$257 million dollar Compact in October 2015 that entered into force in January 2016, targeting the energy and the road sectors. The Compact objective is to “provide (a) access to more reliable and affordable electricity and (b) improve the planning and execution of routine, periodic and emergency road maintenance.”<sup>1</sup>

The Compact is composed of two projects: 1) the Energy Project and 2) the Roads Project. The Energy Project (budgeted at approximately \$201 million) consists of four interconnected activities: (a) Mt. Coffee Rehabilitation Activity, (b) Mt. Coffee Support Activity, (c) Liberia Electricity Corporation Training Center Activity, and (d) Energy Sector Reform Activity. The Roads Project (budgeted at approximately \$21 million) is MCC’s first maintenance-only investment that aims to build institutional systems and capacity for sustainable road maintenance practices. At its design, the project comprised of two activities: 1) the National Road Maintenance Activity aimed to pilot, construct, and equip at least two regional maintenance centers, and matching GOL’s contributions to periodic maintenance through a Matching Road Maintenance Fund, and 2) the Roads Sector Reform Activity focused on building the capacity of the existing and newly created road maintenance institutional systems.

## I.2 OBJECTIVE OF THE REPORT

On April 14, 2019, MCC issued a contract to International Development Group LLC (IDG) to conduct an Economic Analysis and Independent Evaluation Services in support of the Liberia Roads Project. The evaluation is mainly three-fold and interwoven: 1) a review of the activity implementation (Research Area 0) to identify any deviations from the original design, 2) an economic analysis (Research Area 1) to understand the costs and the benefits of the MCC Liberia Roads Project, and 3) performance evaluations of road maintenance, road usage pattern, and transport market structure to complement the knowledge gained through the economic analysis (Research Area 2, 3, and 4). The objective of the Evaluation Design Report (EDR) is to allow MCC to review the following areas:<sup>2</sup>

- Prioritize evaluation questions and outcomes that meet demand from key decision-makers;
- Ensure that the program Objective and all key accountability metrics modeled in the cost-benefit analysis are measured or justification is provided as to why they are not;
- Apply the most rigorous evaluation methodology feasible given project design and implementation rules;
- Clearly define the analysis plan to ensure consensus on outcomes – their definitions and measurement;

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<sup>1</sup> Millennium Challenge Corporation, Millennium Challenge Compact between the United States of America acting through the Millennium Challenge Corporation and the Republic of Liberia acting through the Ministry of Finance and Development Planning, 2015, page.1.

<sup>2</sup> MCC Independent Evaluation Management Guidance – External. Version: February 2020.

- Clearly define sample population and sampling strategy that aligns with project target populations;
- Clearly define exposure period that maps data collection timelines with project start date timelines; and
- Ensure alignment between evaluation design and contract funding and initiate a budget modification, if necessary.

In this report, the team will: i) provide an overview of the Compact and the Roads Project, ii) present the evaluation design, including analysis methodology and a description of the data collection required to implement the methodology, and iii) summarize administrative issues of the evaluation. The EDR incorporates feedback and recommendations from MCC and stakeholders in Liberia.

## II. OVERVIEW OF THE COMPACT AND THE INTERVENTION(S) EVALUATED

### 2.1 OVERVIEW OF THE PROJECT AND IMPLEMENTATION PLAN

#### 2.1.1 Original Project Description

The objective statement of the Roads Project is: “To improve the planning and execution of routine, periodic and emergency road maintenance.”<sup>3</sup> The MCC Compact was signed between the United States of America acting through MCC and the Republic of Liberia acting through the Ministry of Finance and Development Planning on October 2, 2015. It entered into force on January 20, 2016 and will be completed by January 20, 2021. The Roads Project<sup>4</sup> comprises of two interconnected activities designed to build a foundation for Liberia’s national road maintenance planning and execution, and build capacity within the sector. The two activities are: (1) National Road Maintenance Activity, and (2) Roads Sector Reform Activity.

#### (1) National Road Maintenance Activity (\$15.0 million<sup>5</sup>)

The National Road Maintenance Activity was initially designed to pilot, construct, and equip at least two regional maintenance centers (“RMC”), and match Government contributions to periodic maintenance through a matching road fund to better maintain and sustain Liberia’s paved roads and increase institutional capacity in the sector. The two sub-activities are:

- A. Construction of Road Maintenance Centers Sub-Activity.** At project design, MCC funding was intended to support the design and construction of two regional pilot RMCs, one located in the western region of Liberia (in Tubmanburg County and Bomi County) and one located in the southeastern region of Liberia (in River Gee County). The original project design included the option of potentially constructing three additional RMCs, pending approval from MCC and GOL, after the successful completion and the assessment of viability of the first two RMCs.
- B. Matching Road Maintenance Fund Sub-Activity.** At project design, MCC funding was intended to finance periodic road maintenance works through an incentive matching fund (the “National Road Fund”). MCC required that the GOL establish the National Road Fund (NRF) and the Road Fund Administration (RFA), a stand-alone autonomous entity, during the first year of the Compact. The RFA would be responsible for managing the National Road Fund. MCC intended to match GOL’s contributions to periodic road maintenance made to the National Road Fund on a one-to-one basis up to \$8 million during the Compact. MCC contributions to the National Road Fund would be based on measurable indicators of performance on maintenance planning, capacity, and implementation.

#### (2) Roads Sector Reform Activity (\$6.07 million)

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<sup>3</sup> Millennium Challenge Compact between the United States of America acting through the Millennium Challenge Corporation and the Republic of Liberia acting through the Ministry of Finance and Development Planning, 2015, page 1.

<sup>4</sup> Ibid, Annex I, pages 8-9.

<sup>5</sup> Ibid, Exhibit A to Annex II-2, Multi-Year Financial Plan Summary.

The Roads Sector Reform Activity was designed to build capacity and provide technical assistance at the national and regional level. The following sub-activities were included at Compact design:

**A. Network Analysis/Data Collection.** In partnership with the GOL, the United States Department of Transportation (“DOT”) intended to develop a national roadway inventory report and database by:

- i. collecting roadway condition data to support a road network analysis throughout Liberia including primary roads, secondary roads, and feeder roads,
- ii. collecting traffic volume data separated by mode and vehicle type in the dry and wet seasons on the primary and secondary road network,
- iii. collecting any other data that feeds into MCC models or would feed into future models used by the GOL, and
- iv. training future RMC staff to routinely update inventory collection work and successfully apply data for maintenance planning.

**B. Sector Reform/Institutional Strengthening/Capacity Building.** This task was designed to direct the efforts of the roads sector working group to ensure that MCC’s roads sector investments are coordinated and synergistic with the efforts of other major donors. DOT support intended to further institutionalize the involvement of other donors in road maintenance activities and any other transportation planning and capacity building activities including:

- i. providing capacity building related to the Axle Load Control Law,
- ii. strengthening the administrative and operational framework of the National Road Fund,
- iii. training and support in transportation planning methods,
- iv. assisting in the development of a five-year road asset management plan for Liberia,
- v. aiding urban transportation planning in Monrovia, and
- vi. reviewing existing policies concerning road safety and developing a set of recommendations and framework of implementation.

### **2.1.2 Participants**

Below we present the participants for each activity/sub-activity of the Roads Project.

#### **(1) National Road Maintenance Activity**

**A. Construction of Road Maintenance Centers Sub-Activity.** The GOL is a participant in this sub-activity, represented through the Ministry of Public Works (MPW) with its staff at national level and county level in the selected counties (Tubmanburg County, Bomi County, River Gee County).

**B. Matching Road Maintenance Fund Sub-Activity.** The GOL represented through the Office of the National Road Fund, to be established during the first year of the Compact, is the participant.

## (2) Roads Sector Reform Activity

- A. **Network Analysis/Data Collection.** The GOL is a participant in this technical assistance and training activity, represented through the MPW at the national and county level as well as the Ministry of Transport (MoT) and Liberia Institute for Statistics and Geo-Information Systems (LISGIS).
- B. **Sector Reform/Institutional Strengthening/Capacity Building.** In addition to the participants listed under (A), development partners are also participants in this Sub-activity.

### 2.1.3 Geographical Coverage

The geographical coverage of the project depends on each activity. The **Construction of Road Maintenance Centers Sub-Activity** serves the western region of Liberia, in Tubmanburg County and Bomi County, and the southeastern region of Liberia, in River Gee County. Under the **Matching Road Maintenance Fund Sub-Activity**, the activities under the Roads Project were not sufficiently designed when the MCC Compact was signed to specify a geographical coverage within Liberia. The periodic road maintenance works that will be matched with funding from MCC through the Matching Road Maintenance Fund Sub-Activity will be selected based on the Highway Development and Management-4 (HDM-4) analysis. Therefore, the geographical coverage of the potential works is not yet specified as of December 2019. The **Roads Sector Reform Activity** has a nation-wide geographical coverage for both sub-activities.

### 2.1.4 Implementation to Date

#### (1) National Road Maintenance Activity (no funds disbursed)

The National Road Maintenance Activity was modified as part of a Project and Compact modification in October 2017. Several conditions precedent (CPs) for the Project were adjusted as follows:

- A. **Construction of Road Maintenance Centers Sub-Activity.** This Sub-Activity was eliminated in October 2017 due to the lack of progress. The Sub-Activity budget of \$7 million was reallocated to Sub-Activity (B) Matching Road Maintenance Fund.
- B. **Matching Road Maintenance Fund Sub-Activity.** The National Road Fund Act was passed in 2016 and made effective in January 2017. The act establishes a fund dedicated to road and bridge maintenance works and commits road use charges (fuel levy, registration, and licenses fees to vehicles and drivers, entry fees levied on foreign motor vehicles, and charges to vehicles using the road) to raise revenue for the fund. According to the Act, more than 60 percent of the funds have to be used for road maintenance, while up to 40 percent can be used for rehabilitation works. The Act also establishes the Office of the Road Fund, responsible for the management and administration of the National Road Fund. The Office of the Road Fund became operational in May 2018. However, while the fuel levy collected was over \$29 million, only \$3.5 million were secured for the Matching Fund Account. When the GOL did not deposit the fuel levy into the NRF by the requested date, a key CP to fund the matching fund, MCC notified the GOL and withheld the funds for the Matching Road Maintenance Sub-Activity (\$15 million inclusive of the \$7 million reallocated from Sub-Activity A).

**(2) Roads Sector Reform Activity (\$ 5.0 million disbursed as of August 2019)**

**A. Network Analysis/Data Collection.** The United States DOT, John A. Volpe National Transportation Systems Center (“Volpe”) conducted a road network analysis with a roadway and bridge and culvert inventory on the primary network, collected traffic volume data on primary and secondary roads for dry and wet season, and led a condition assessment on primary roads (not bridges). MPW staff at the national and county levels, LISGIS staff, and MoT staff were trained in how to collect data and update the database. MPW involves contractors, LISGIS, and the University of Liberia in the data collection. The data provided by Volpe are being used to assist in the planning and preparation of the Five-Year National Medium-Term Road Maintenance Plan (NMRMP) 2019-2023 and One-Year Road Maintenance Plan 2019 (see Sub-Activity (B) below). Currently, MPW is consolidating and analyzing the data from the new Nationwide Road Inventory Survey to be included and made available in an Interim Report by the end of August 2019.

**B. Sector Reform/Institutional Strengthening/Capacity Building.** Volpe and subcontractor Booz Allen Hamilton (BAH) conducted HDM-4 trainings for the Road Maintenance Management Unit (RMMU) within the Infrastructure Implementation Unit (IIU) of MPW. Subsequently, trainings were also provided to the NRF staff between June and July of 2019. The trainings aimed to enable the staff to use HDM-4 to a) make road asset management decisions and b) plan and develop the preliminary five-year and one-year road maintenance program. The RMMU was trained by Volpe in using HDM-4 with the data collected with World Bank support. Following the Volpe trainings, the RMMU prepared the first Five-Year NMRMP and the One-Year Road Maintenance Plan 2018. The Inter-Ministerial Steering Committee (IMSC) approved the template for the Five-Year NMRMP and the One-Year Road Maintenance Plan 2018 in January 2019 but the plans were not approved. Currently, the RMMU is preparing the second iteration of the Five-Year NMRMP 2019-2023 and the One-Year Road Maintenance Plan 2019 with Level 2 calibration based on the approved template. The second iteration of the Five-Year NMRMP is intended to incorporate the condition data collected with Volpe training and expand the plan to also include maintenance to secondary and feeder roads. The second iteration of the plan will build on the technical assistance provided to the RMMU and the NRF staff. The plan also includes prioritization of periodic maintenance using HDM-4 with the software licenses obtained with support from the Roads Project. Routine maintenance prioritization is done with Road Maintenance Planning System (ROMAPS), a software provided by GIZ. The TOR for a Road Asset Management System (RAMS) that will consolidate various systems within the MPW for more effective planning around the development and maintenance has been prepared and the system procurement is planned for 2020. An Act establishing a Road Agency to serve as an implementing arm has been drafted by the GOL. It is anticipated that the current IIU will become the Road Agency.

The most active donors in road maintenance are the World Bank, SIDA, GIZ, USAID, EU, and MCC. While maintenance programs are scattered geographically, donor capacity building efforts are reported to be well coordinated, creating synergies. The Millennium Challenge Account-Liberia (MCA-L) holds biannual donor coordination meetings for the roads sector. The GOL has an Infrastructure Technical Working Group

which has monthly meetings with stakeholders in the roads sector at the technical level. There are quarterly meetings at the policy level. The MPW has a donor aid coordinator. However, the MPW does not have a single training program in which it lays out the training needs where donors can see how they can contribute.

The total funding for the Roads Project is \$21.07 million. Of the total funds allocated to the Project, MCC provided \$5.0 million in obligational authority to the Volpe Center that is being spent down as the road sector project progresses.

**Table II-i: Total Roads Project Funding Disbursed as of August 2019**

Roads Project	Budgeted (USD million)	Disbursed (USD million)	% Disbursed
(1) National Road Maintenance Activity	15.00	0.0	0
(2) Roads Sector Reform Activity	6.07	5.0	82.4
<b>Total</b>	<b>21.07</b>	<b>5.0</b>	<b>23.7</b>

## 2.2 THEORY OF CHANGE

### 2.2.1 MCC Roads Program Logic

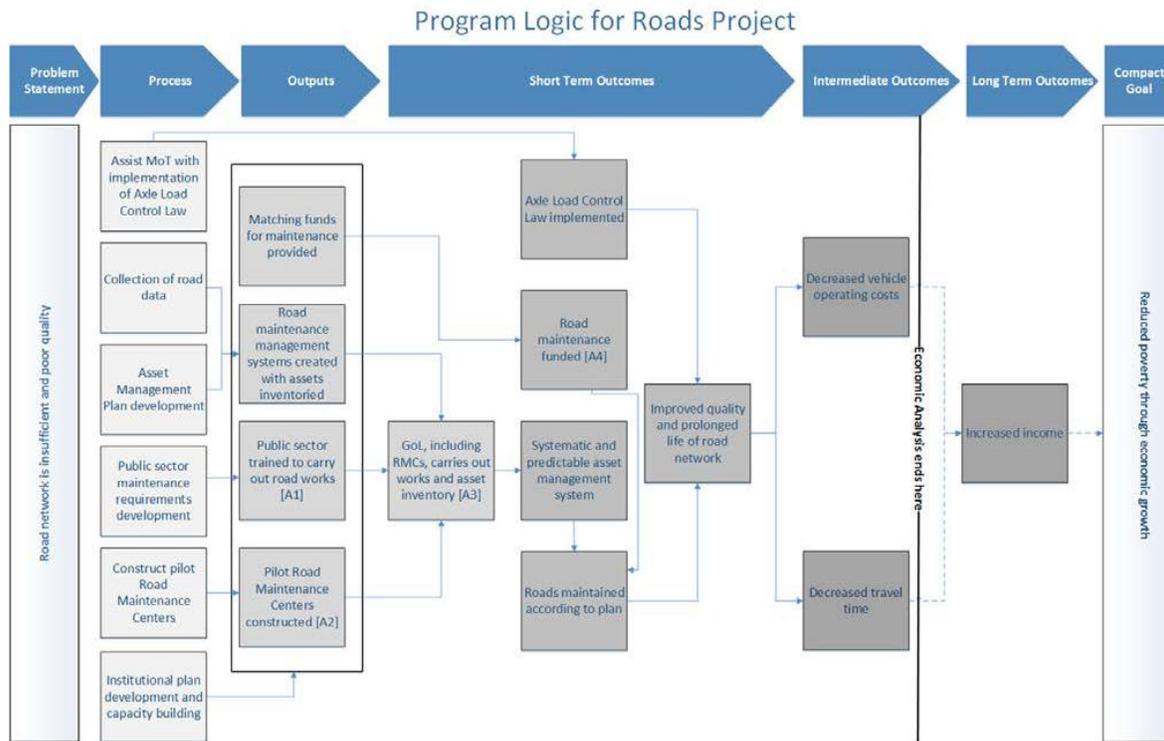
The objective statement of the Roads Project is: “To improve the planning and execution of routine, periodic and emergency road maintenance.”<sup>6</sup> MCC’s Roads Program logic unpacked the objective in six project outcomes: (a) Improved planning of routine road maintenance, (b) Improved planning of periodic road maintenance, (c) Improved planning of emergency road maintenance, (d) Improved execution of routine road maintenance, (e) Improved execution of periodic road maintenance, and (f) Improved execution of emergency road maintenance.

The original graphic illustration of the program logic of the 2016 M&E Plan (Figure II.1) shows that the project activities are expected to improve the policy and regulatory environment and maintenance occurring in the road sector. An improved management of the road sector is expected to result in an improved quality and prolonged life of the road network, which will lead to decrease vehicle operating costs (VOCs) and travel time (TT) for road users.

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<sup>6</sup> Millennium Challenge Compact between the United States of America acting through the Millennium Challenge Corporation and the Republic of Liberia acting through the Ministry of Finance and Development Planning, 2015, page 1.

**Figure II.1: MCC Liberia Roads Program Logic<sup>7</sup>**



### 2.2.2 Alternative Theory of Change proposed by Evaluator

The program logic in the 2016 M&E Plan does not take into account the six outcomes in the Project objective statement. Apart from “improved quality and prolonged life of road network”, the other short-term outcomes in the original program logic are outputs. Strengthened capacities resulting from technical assistance and trainings are not included in the Theory of Change. Furthermore, the program logic does not depict critical assumptions.

The evaluation team proposes a revision of the Theory of Change which takes into account the cancellation of Sub-activity 1 (A) Construction of Road Maintenance Centers and the withheld funds under Sub-activity 1 (B) Matching Road Maintenance Fund. Figure II.2 shows the revised Theory of Change for Activity (2) Roads Sector Reform. It shows how the Project is aligned with the Liberia Pro-Poor Agenda for Prosperity and Development (PAPD) 2019-2023, *Pillar 2.2: Priority interventions* including “Establish an effective road maintenance organization and system” and how it contributes to *Pillar 2.2: Development outcome* “Increased inclusive social and economic activity and connectivity through critical infrastructure improvement.”<sup>8</sup>

The key outputs of the Roads Sector Reform Activity are (refer to Figure II.2 for more information): Government staff trained in i) data collection and adding the data into RAMS, ii) planning of road maintenance and improvement decisions, and iii) approval of road maintenance projects. This is complemented by data collection manuals and traffic counting equipment and RAMS which consolidates the different systems in use by MPW. The use of and access to these outputs is expected to lead to outcomes, a change in the way road maintenance planning and

<sup>7</sup> MCA Liberia: M&E Plan July 2016, page 14.

<sup>8</sup> Liberia Pro-Poor Agenda for Prosperity and Development (PAPD) 2019-2023.

implementation is performed, such as strengthened capacities of GOL staff in consistent data collection and a routinely update of data in RAMS, planning of road maintenance; and a Five-Year NMRMP and One-Year Road Maintenance Plan with prioritized maintenance projects which was prepared by MPW itself and prioritized maintenance projects from the plan approved by the NRF. This is expected to lead to an improved planning and improved execution of road maintenance.

The revised Theory of Change depicts the six outcomes of the Project objective statement and shows that the “key outcomes” mentioned in the 2016 M&E Plan<sup>9</sup> (improved quality of road network, prolonged life of road network, decreased vehicle operating costs, decreased travel time) are results of the achievement of the Roads Project objective beyond the Project’s horizon rather than the final outcomes of the project.

There are critical assumptions for the achievement of the Project objective:

- Sufficient funding is allocated to road maintenance,
- Sufficient funding is allocated to data collection,
- Funds allocated in the NRF for road maintenance are actually used for road maintenance,
- There is a good coordination of the Government with donors in the roads sector,
- Periodic road maintenance projects are prioritized and executed by using the Economic Internal Rate of Return (EIRR),
- Performance-based road maintenance contracts are implemented as scheduled, and
- Training and other capacity strengthening efforts by the project resulted in a willingness of Government staff - benefitting from the project’s support - to apply the know-how in the execution of road maintenance.

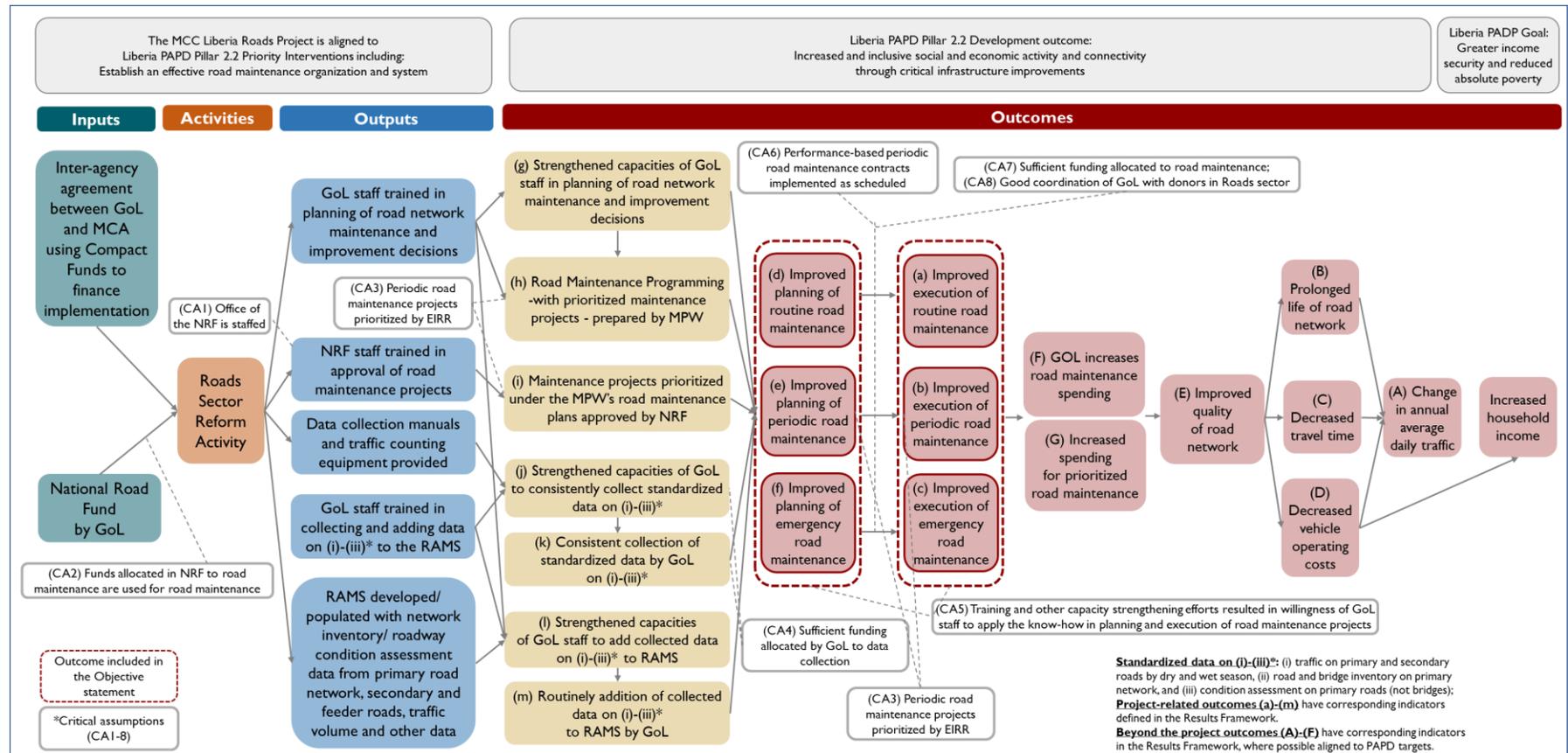
Since Activity 1 is currently not active, it is unlikely that roads will receive periodic maintenance using MCC matching funds. Thus, it is anticipated that the “improved execution” in the Project’s objective statement will be more difficult to achieve than the “improved planning”. The Scope of Work for this evaluation outlines that “the performance evaluation components (...) seek to complement the economic analysis by answering descriptive questions that provide context to and enhance the knowledge gained through the economic analysis. **The program logic should be used as a key reference for determining what complementary information is most relevant.**”<sup>10</sup> The revised Theory of Change and the accompanying Results Framework will be therefore used by the evaluation team as a key reference for determining this.

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<sup>9</sup> Ibid, page 29.

<sup>10</sup> MCC Liberia Roads Project – Evaluation Scope of Work, page 17.

Figure II.2: Revised Theory of Change of the Roads Project



## **2.3 COST-BENEFIT ANALYSIS**

A Cost-Benefit Analysis (CBA) for the MCC Compact was not completed at the time of evaluation design.

## **2.4 BENEFICIARY ANALYSIS**

MCC considers beneficiaries of projects to be those people who experience better standards of living as a result of the project through higher real incomes (in this case, through cost savings).<sup>11</sup> The 2016 M&E Plan states that “the activities under the Road Project are not sufficiently designed to develop a beneficiary analysis.”<sup>12</sup> The targeted project beneficiaries are road users. The improved management of the road sector is expected to result in a larger stock of well-maintained roads, which will decrease vehicle operating costs and provide time savings for road users<sup>13</sup>. It is anticipated that this will contribute to an increased volume of transport of goods in trucks and people in buses and will contribute to the development outcome of increased household income.

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<sup>11</sup> MCC Guidelines for Economic and Beneficiary Analysis.

<sup>12</sup> MCA Liberia: M&E Plan July 2016, page 21.

<sup>13</sup> MCC Liberia Roads Project – Evaluation Scope of Work, page 16

### III. EVALUATION AREAS AND QUESTIONS

#### 3.1 EVALUATION AREA AND QUESTIONS

The evaluation will address the following evaluation areas and evaluation questions:

##### **Evaluation Area 0: Project Implementation**

To what extent did the Project have a clear plan? Was it implemented according to plan? Where there any deviations from the original design? If so, deviations and the overall evolution should be documented to the greatest extent possible.

##### **Evaluation Area 1: Engineering Analysis and Economic Model**

What is the economic return of the road maintenance investments? What factors drove changes to the ERRs over time? How could the project have been designed to result in a higher ERR?

##### **Evaluation Area 2: Maintenance**

2A. What are the relevant road authority's maintenance practices? How have these changed since the beginning of the Compact?

2B. How were routine, periodic and emergency maintenance works planned and executed by the Government before the Compact and how are they planned and executed after the Compact? Did planning and execution of routine, periodic and emergency road maintenance improve? [Objective Question (Main Evaluation Question)]

- **2B\_1:** Did the improved planning and execution of road maintenance result in maintenance cost savings?
- **2B\_2:** How does the execution of road maintenance compare to the GOL's maintenance plans?
- **2B\_3:** If maintenance is carried out using the improved planning methods implemented by MCC using HDM-4 and cost savings result, are cost savings returned to the Government of Liberia, or are the added available funds used to carry out further maintenance?
- **2B\_4:** What is the role of the private sector in the new maintenance regime and how does this compare to the role envisioned for it under the Project?
- **2B\_5:** The established procedure put in place by the program includes, (1) Data collection, (2) Data analysis, (3) Planning, (4) NRF Approval of planned prioritized MPW works, (5) Allocation of funding by NRF, (6) Timely award of road maintenance contracts, and (7) Execution. The success of this program going forward depends on continuing this process. How likely is it that the Government will perpetuate this cycle post-compact? What, if anything, could MCC have done differently to ensure this cycle would last longer?
- **2B\_6:** How sustainable is the new maintenance regime? Volpe's assistance is currently slated to end at the end of July 2019. After that, Volpe will only be assisting with RAMS, but will not be helping MPW with HDM-4, data collection,

etc. Sustainability activities could continue Volpe's assistance for one more cycle. Can GOL continue to use the system on their own? Why? If not, what could MCC have done differently to ensure the GOL would continue to use the system on their own?

- **2B\_7:** Does the overall quality of the road network improve, as a result of MCC's investments in maintenance planning and execution?

2C. What organizational, political, and economic factors are shaping road maintenance decisions and practices in Liberia?

- **2C\_1:** How is road maintenance regulated?
- **2C\_2:** How and to what extent did the Compact help to clarify and strengthen governance and regulatory arrangements for road maintenance?
- **2C\_3:** How is road maintenance funded and how does this compare to funding needs and projections?
- **2C\_4:** How did this change from before the MCC intervention to after?
- **2C\_5:** What evidence is there that MCC facilitated those changes (if relevant)?
- **2C\_6:** Are there factors influencing road transport agencies' policies and practices that could have been addressed by MCC to improve investment outcomes? What are these factors, and how should they be assessed during project design?
- **2C\_7:** Are the funds in the National Road Fund being used to maintain the road network?

**Evaluation Area 3: Road Usage Patterns** [optional, dependent on whether cost savings are used for added maintenance]<sup>14</sup>

Have road usage patterns changed, in terms of who is traveling on the roads, why, what they are transporting, what they are paying for transport, and how long it takes to move along key routes?

**Evaluation Area 4: Transportation Market Structure** [optional, dependent on whether cost savings are used for added maintenance]

Given the existing transportation market structure, what portion of VOC savings will be passed on to consumers of transportation services? If not all savings are passed on, could this project have cost effectively addressed these inefficiencies? How? How is the transportation market structured and what is the likelihood that VOC savings will be passed on to consumers of transportation services? Did this change from before the MCC intervention to after? What evidence is there that MCC facilitated those changes (if relevant)?

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<sup>14</sup> The evaluation SOW initially did not list Evaluation Area 3 as an optional evaluation area. However, it was later determined that Evaluation Area 3 will be optional given the development of Compact activities.

## 3.2 LITERATURE REVIEW

### 3.2.1 Summary of Existing Evidence

#### Evaluation Question 0

Summary of existing evidence is not applicable for Evaluation Area 0.

#### Evaluation Question 1

Benefits of data-driven maintenance planning are well established. When a pavement needs treatment, the sooner a maintenance or rehabilitation activity is undertaken, the more cost-effective it will tend to be in the long term. Pavement deterioration curves indicate that deterioration accelerates with time and the cost of sustainable maintenance increases by several folds with delay in maintenance.<sup>15</sup> In order to restore pavement condition to a pre-determined level, it will cost four to five times as much if the pavement is allowed to deteriorate for even a few years beyond the optimum rehabilitation point.

RAMS is useful in informing short-to-medium term road maintenance plans by optimizing allocation of maintenance resources and selection of projects to improve road conditions in the long term. Without a maintenance planning approach using RAMS, maintenance budget allocation methods are likely to favor the “worst-first” policy, whereas the benefit-cost rationale with RAMS can assign high priorities to pavements in fair-to-poor condition rather than always starting with the pavements in their worst condition.<sup>16</sup> Maintenance planning and budgeting using RAMS has been proven to have a major impact on long term pavement condition for the budget allocated, with significantly better road conditions when budgets are allocated based on recommendations from a pavement maintenance management system.<sup>17</sup>

For instance, a study<sup>18</sup> determined that there was a 3.5% improvement in pavement condition (2.64 PCI<sup>19</sup> points) after an Iowa DOT program implemented the recommendations from a pavement management system. This study used the cost of achieving higher PCI without a planning system to estimate the benefit of using data-driven maintenance planning. The study also showed that improved road condition will also result in reduced vehicle operating cost and improved travel time (if the difference in condition is large).

Similarly, a report sharing the experiences of the California, Minnesota, New York, and Utah DOT<sup>20</sup> states that strong pavement management programs (i.e. data-driven maintenance planning) can benefit transportation agencies tremendously. The report mentions that “on a grand scale, the agencies report that their pavement management programs have enabled the agencies to use money more effectively, which has resulted in the best possible conditions for the funding levels available”. However, according to the same report, the benefits associated with the implementation

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<sup>15</sup> D.E. Peterson. Good Roads Cost Less (Pavement Rehabilitation Needs, Benefits, and Costs in Utah). Report No. UDOT-MR-77-8, Utah DOT, Salt Lake City, UT, 1987.

<sup>16</sup> A Guide for Local Agency Pavement Managers, Washington State Department of Transportation, 1994.

<sup>17</sup> Omar Smadi, Quantifying the Benefits of Pavement Management, 6th International Conference on Managing Pavements, 2004.

<sup>18</sup> Omar Smadi, Quantifying the Benefits of Pavement Management, 6th International Conference on Managing Pavements, 2004

<sup>19</sup> PCI – Pavement Condition Index

<sup>20</sup> US Department of Transportation, Federal Highway Administration, Pavement Management Systems Peer Exchange Program Report, May 2008

and use of a pavement management program are subjective to a large degree and difficult to quantify directly.

### **Evaluation Question 2**

There is a vast range of literature available on civil works projects that have a capacity building component. Unfortunately, there is limited literature that links capacity building with improved ability to plan and execute maintenance and its general effectiveness. The team found a few studies that recommended a more targeted approach to capacity building. A few examples include an ADB Performance Evaluation Report of a Road Rehabilitation Project in Kyrgyz Republic which found that the envisioned capacity building to strengthen the road sector institutions, develop a road maintenance plan, and improve road funding targeted in conjunction with road rehabilitation project were complex and the implementation time for institutional reforms exceeded the implementation period of the civil work projects.<sup>21</sup> The evaluation recommended reforms to be pursued on a selective basis over a longer period of time. The MCC Principles into Practice “Lessons from MCC’s Investments in Roads” paper, concluded that the conditions precedent to incentivize road maintenance were not effective across all investments, and a more programmatic approach to improve maintenance might be required.

### **Evaluation Question 3**

Currently, the team is not aware of any literature that explores the change in road usage patterns before and after road maintenance improvement in Liberia that can support the evaluation.

### **Evaluation Question 4**

Liberia has a limited transport network consisting of approximately 11,423 km of roads, four seaports spread along its coast, three rail lines which were developed to facilitate mineral exports from the interior, and one international airport along with numerous other rural/domestic airports spread out throughout the country. Although there is significant potential for developing multi-modal links in the country, road transport continues to be the dominant and most economical mode of transport in Liberia.<sup>22</sup>

Road transport is utilized for transporting passenger (private and public transport) and cargo. In terms of public transport services, a wide range of vehicles are used in Liberia including motorcycles operating as taxis carrying individual passengers in urban and rural areas; passenger cars operating as taxis for individual passengers in Monrovia and as taxis operating on designated routes on urban, inter-urban and rural services; minibuses operating on fixed urban and inter-urban routes; four-wheel drive vehicles (referred to as “jeeps”) mainly on inter-urban services; pickups and light trucks carrying passengers, luggage and cargo on inter-urban and rural services; and medium-sized and full-sized conventional buses on urban and inter-urban services.<sup>23</sup>

## **3.2.2 Gaps in Literature**

### **Evaluation Question 0**

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<sup>21</sup> ADB, Performance Evaluation Report, Kyrgyz Republic: Road Rehabilitation Project, Second Road Rehabilitation Project, and Third Road Rehabilitation Project, 2010

<sup>22</sup> The World Bank Group. Transport Global Practice. Africa Region. Project Appraisal Document for the Southeastern Corridor Road Asset Management Project. Report No: PAD 1849. 2018

<sup>23</sup> Ministry of Transport and Ministry of Public Works, Liberia. The National Transport Master Plan of Liberia. 4 Transport Sector Overview. 2012

Gaps in literature is not applicable for Evaluation Area 0.

### **Evaluation Question 1**

Quantifying the benefits of technical assistance poses many difficulties unlike a road investment where benefits can be directly measured from the changes that result from the road improvement. Donor agencies often do not evaluate technical assistance programs using quantitative measures. A review of 40 project appraisals that assessed the effect of technical assistance projects states the following:

*Original intent was to classify the 40 projects both by type and by methodology used in the appraisal. However, in not a single case was a quantitative technique used in the appraisal, generally without any significant qualitative economic analysis, other than to verify that the project met the criteria of the country assistance strategy. In fact, with one qualification the only method used to appraise the TA was professional judgement. In most of the 1994 and all of the 1995 loans, lessons learned from past [World] Bank experience in the country or similar projects in other countries were taken into account. However, there was never an attempt to make an ex-post quantitative analysis of the other projects reviewed. In almost all cases the design of the new project was said to have been adapted to take into account problems in past projects. In addition, in all of the 12 non-TA loans for which an economic rate of return was estimated, the TA portion was excluded from the calculations".<sup>24</sup>*

The study recommends CBA for institutional development technical assistance with output that permit valuation, whereas for other technical assistance, cost-effectiveness analysis is recommended. There are also limited studies<sup>25</sup> attempting to quantify the benefits of improving maintenance planning systems.

### **Evaluation Question 2**

There is limited literature on the effectiveness of interventions to build capacity to plan and execute road maintenance. The current evaluation results will help bridge the gap in literature by providing evidence of targeted capacity building support and its effectiveness in improving planning and execution of routine, periodic and emergency road maintenance.

### **Evaluation Question 3**

The key linkage between road investments and economic benefits is the reduction in VOCs and TT and how they influence the demand for transportation services. Changes in the demand for transportation services can generally be seen through changes in road usage patterns, such as traffic composition and volume. This is consistent for different types of road investments including construction, rehabilitation, and maintenance. Such changes, however, are usually more pronounced for road construction/rehabilitation projects and less for maintenance projects. The reason behind this is that for a road construction/rehabilitation project, the condition of a road can be drastically improved from 'poor' to 'good', thereby yielding changes in road usage patterns that

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<sup>24</sup> Gary McMahon, Applying economic analysis to technical assistance projects, The World Bank, Policy Research Department, Washington DC, January 1997.

<sup>25</sup> Omar Smadi, Quantifying the Benefits of Pavement Management, 6th International Conference on Managing Pavements, 2004

are much more significant than a maintenance project where the condition of a road may simply be improved from ‘poor’ to ‘fair’ or ‘fair’ to ‘good’ condition.

#### **Evaluation Question 4**

Similar to Evaluation Area 3, changes in transport costs are not expected to be in the same order of magnitude as changes that would otherwise come from road construction/rehabilitation projects. The reason behind this is that for a road construction/rehabilitation project, the condition of a road can be drastically improved from ‘poor’ to ‘good’, thereby potentially yielding changes that are much more significant than changes from a maintenance project where the condition of a road may simply be incrementally improved from ‘poor’ to ‘fair’ or ‘fair’ to ‘good’ condition. In any case, it is important to study whether the transportation market has changed following any road investment, whether a major rehabilitation or minor maintenance works. In the case of the Liberia Roads Project, the evaluation team will study how the transportation market has been impacted by the selected maintenance works resulting from the maintenance planning activities of MPW.

### **3.2.3 Policy Relevance of the Evaluation**

#### **Evaluation Question 0**

The response to Evaluation Question 0 will help to inform MCC’s future design of road projects.

#### **Evaluation Question 1**

Evaluation Question 1 helps to inform MCC and other development partner’s understanding of the costs and the benefits of road maintenance technical assistance projects that are often not quantified.

#### **Evaluation Question 2**

Evaluation Questions 2A, 2B, and 2C complement each other to inform the changes that take place in Liberia’s road maintenance practices. As MCC’s first maintenance-only investment that aims to build institutional systems and capacity for sustainable road maintenance practices, the evaluation questions will provide an insight to MCC and other donors on the effect of technical assistance projects in road maintenance.

#### **Evaluation Question 3**

Evaluation Question 3 helps to inform MCC and other development partner’s understanding of road users that benefit from the Roads Project. The evaluation question is intended to shine light on who benefits from the MCC’s matching fund activities and changes in road users’ experience before and after a road maintenance project.

#### **Evaluation Question 4**

Evaluation Question 4 helps to inform MCC and other development partner’s understanding of who actually benefits from road maintenance projects. The evaluation question is intended to shine light on how the benefits of MCC’s matching fund activities are distributed.

## IV. EVALUATION DESIGN

### 4.1 EVALUATION DESIGN OVERVIEW

Evaluation methodology is determined by each evaluation question. **Table IV-i** presents the evaluation type, evaluation design methodology, and data collection methods as appropriate for each evaluation question.

**Table IV-i Evaluation Design Matrix**

Evaluation Question (EQ)	Evaluation Type	Evaluation Design Methodology	Data Collection Method	
			Baseline	Endline
EQ#0	Performance Evaluation	Ex-post	N/A	KIIs (conducted in September/October 2020 during the trip to collect EQ 2)
				Review of secondary sources
EQ#1	Performance Evaluation (Economic Analysis)	Modelling	N/A	KIIs
			Summary review of secondary sources. The secondary sources will be collected during meetings with stakeholders conducted as part of EQ#2 KIIs	Review of secondary sources
EQ#2A	Performance Evaluation	Pre-post	KIIs (retrospective baseline)	KIIs
			Review of secondary sources	Review of secondary sources
EQ#2B and all sub-questions	Performance Evaluation	Pre-post	KIIs (retrospective baseline)	KIIs
			Review of secondary sources	Review of secondary sources
EQ#2C and all sub-questions	Performance Evaluation	Pre-post	KIIs (retrospective baseline)	KIIs
			Review of	Review of

Evaluation Question (EQ)	Evaluation Type	Evaluation Design Methodology	Data Collection Method	
			Baseline	Endline
			secondary sources	secondary sources
EQ#3 (optional)	Performance Evaluation	Ex-post	N/A	Origin-Destination Survey
			N/A	Public Transport User survey
EQ#4 (optional)	Performance Evaluation	Ex-post	N/A	Origin-Destination Survey
			N/A	Public Transport User survey
			N/A	KIIs
			N/A	Review of secondary sources

MCC’s Policy for Monitoring and Evaluation<sup>26</sup> defines two main types of evaluation: impact and performance. Based on MCC’s definition of performance evaluations, this evaluation is considered a performance evaluation<sup>27</sup> for all of the evaluation questions. Given the focus of EQ#1 on cost-effectiveness, this particular evaluation question can be also considered an economic analysis employing a cost-benefit analysis.

Except for EQ 1 and EQ 2, all other evaluation questions are ex-post evaluations where post-Compact data will be used to answer the evaluation questions. EQ 1 will not compare baseline and endline values but rather model and analyze the base case scenario and the reform case scenario using available data. EQ 2 will employ pre-post comparison to examine the changes that took place before and after the capacity building technical assistance. Detailed primary and secondary data collection methodology will be discussed in following sections for each evaluation question and sub-question. The evaluation will use a mixed-methods approach, employing both quantitative and qualitative methods for the performance evaluation.

**Table IV-ii** below presents the results framework of the Liberia Roads Project<sup>28</sup>. It contains:

- Project-related outcomes (a)-(m) with indicators 1-18 (Indicators 2, 3, 5 and 8 were deleted based on feedback received from MCC on the draft EDR).
- Critical assumptions (CA1-CA8)
- Beyond the project’s horizon outcomes (A)-(G) with indicators A1-G1

Indicators are described with unit of measurement (UoM), baseline and endline target, frequency with which they are collected, data sources and methodology and responsibility for the data

<sup>26</sup> MCC Policy for Monitoring and Evaluation, March 15, 2017, <https://www.mcc.gov/resources/doc/policy-for-monitoring-and-evaluation#fn-12-a>.

<sup>27</sup> MCC defines performance evaluation as “A study that seeks to answer descriptive questions, such as: what were the objectives of a particular project or program; what the project or program has achieved; how it has been implemented; how it is perceived and valued; whether expected results are occurring and are sustainable; and other questions that are pertinent to program design, management, and operational decision making. MCC’s performance evaluations also address questions of program impact and cost-effectiveness.”

<sup>28</sup> The revised Results Framework was drafted by the IDG Evaluation Team, because the initial Results Framework in the 2016 M&E Plan is outdated due to the halting of the National Road Maintenance Activity in June 2019. This revised Results Framework should be viewed together with the revised Theory of Change (Program Logic) because the Program Logic outcomes and indicators are referred to in the Results Framework.

collection as well as description/comments. A separate column links the project-related outcomes, critical assumptions and the outcomes that are beyond-the project's horizon.

The indicator “baseline” in this Results Framework is different from the “baseline period” (December 2019 – July 2021) in which the evaluation of the Roads Project will perform data collection. The MCC Liberia Compact was signed in October 2015 and officially entered into force in January 2016. The baseline year for an indicator in the Results Framework is therefore in most cases the year 2015, pre-Compact. Some indicators refer to the Five-Year NMRMP (2019-2023) or the One-Year Road Maintenance Program, for which the baseline is 2019, the first time when they were done with TA support from the Roads Project. For a few national-level indicators, for example “Share of road network in excellent, good or fair, poor or very poor condition of total classified paved roads”, the baseline depends on the year in which the relevant survey was conducted. The Compact finishes in January 2021.

The evaluation will select the timing of the endline using a data-driven decision point. The team will monitor the budget approval process in July 2021 to observe whether the budget allocation is done as per the prioritized maintenance plan that used HDM. If the budget allocation is done as per the prioritized maintenance plan, endline data collection will be conducted in July/August 2022. However, the team recognizes that due to unforeseen economic events, such as the impact of COVID-19, the Liberian economy might not return to business as usual until 2021. Therefore, if the budget approval process in 2021 does not make budget allocations based on the prioritized plan, the evaluation team will monitor the progress made from July 2021 to July 2022. The progress will be assessed in July 2022 as follows:

- If the budget allocation is done as per the prioritized maintenance plan that used HDM during the budget approval process in July 2022, the endline data collection will be conducted in July/August 2023.
- If the budget allocation is not done based on the prioritized maintenance plan, the endline data collection will take place in August/September 2022. The team believes that if the maintenance implementation plan is not implemented by 2022 it is unlikely to be successful in subsequent years. Conducting the endline in 2022, will provide helpful insights into what worked and what did not work and reduce as much as possible the recall bias of respondents.

Table IV-ii Roads Project Results Framework<sup>29</sup>

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
<b>MCC Liberia Roads Project Objective: "To improve the planning and execution of routine, periodic and emergency road maintenance" (MCC Liberia Compact Agreement, Article 1)</b>								
<b>Outcomes (a)-(c): Improved execution of routine, periodic and emergency road maintenance</b>								
01	<b>PAPD high level national indicator:</b> Kilometers of primary, secondary, and urban roads maintained	Kilometers (km)	Pre-Compact baseline:  to be identified if MPW has data for this indicator  (2016)	<b>National high level target:</b>  4,184.7  (2023) The trend will be assessed in  2022/2023	Annually (? – Depending on how often the GOL tracks this national indicator)	Secondary sources (quantitative): Annual Implementation Progress Report on PAPD 2019-2023  Annual Report of MPW (feeds into Annual Implementation Report on PAPD)	ICDU for PAPD at MoFDP  MPW, M&E Directorate	<b>Used in Evaluation Questions 2B, 2B_2, 2B_5, 2C_3</b>  <b>Note:</b> MCC's contribution to the Matching Road Maintenance Fund is withheld, because of the GOL non-compliance with the pre-conditions for MCC's matching of funds. While the funds are withheld, road maintenance works for which MCC has matched the GOL funds are on hold. The rationale for seeing an improved implementation through MCC's support: The particular road maintained might not have been on the list for periodic maintenance of the 5-Year NMRMP/ One-Year Road Maintenance Program if it was not for the MCC Training and Support to HDM-4 (but it is not a sole attribution to MCC).  <b>Measures the achievement of outcomes (a)-(c)</b>  According to the Liberia Pro-Poor Agenda for Prosperity and Development (PAPD) 2019-2023 (p. 58): "Liberia has approximately 11,536 kilometers (km) of primary, secondary, urban and feeder roads. These comprise about 1,899, 2,479 and 6,263 km of unpaved primary, secondary and feeder roads respectively. Approximately 622 km of the total are paved roads."  The PAPD has a high level national target for roads maintained for 2023. The Implementation Coordination and Development Unit (ICDU) at the MoFDP should have the baseline for 2017 or 2018, before the PADP implementation started. It is not clear if the data for the pre-compact (before 10/2015) can be obtained.
<b>Outcome (a): Improved execution of routine road maintenance</b>								
04	Share of financial needs for <u>routine maintenance</u> projects according to Annual Road Maintenance Expenditure Program that were met with budget disbursed	Percent (%)	First year of Annual Road Maint. Exp. Progr. as baseline:  to be identified  (2019)	to be identified  (2022/ 2023)	During endline - collect the indicator value for each year since the baseline, this will show a trend	Secondary sources (quantitative and qualitative): Annual Road Maintenance Expenditure Program of NRF  Annual Report of NRF  FMIS of MoFDP  Annual Budget Execution Report of MoFDP	Office of the NRF MoFDP	<b>Used in Evaluation Questions 2B, 2B_2, 2B_5, 2C_3</b>  <b>Measures the achievement of outcome (a)</b>  "Needed" means financial needs for routine maintenance of roads in excellent, good, and fair conditions, based on prioritization done with ROMAPS in the One-Year Road Maintenance Program, as included in the Annual Road Maintenance Expenditure Program.  "Met" means actual budget disbursed for routine maintenance.  Challenges 1-2: see challenges 1-2 above.
<b>Outcome (b): Improved execution of periodic road maintenance</b>								
06	Share of financial needs for <u>periodic maintenance for PSIDPs</u> according to Annual Road Maintenance Expenditure Program that were met with budget disbursed	Percent (%)	First year of Annual Road Maint. Exp. Progr. as baseline:  to be identified  (2019)	to be identified  (2022/2023)	During endline - collect the indicator value for each year since the baseline, this will show a trend	Secondary sources (quantitative and qualitative): Annual Road Maintenance Expenditure Program of the NRF  Annual Report of Office of the NRF  MPW/ Finance Division database	Office of the NRF MPW/ Finance Division	<b>Used in Evaluation Questions 2B, 2B_2, 2B_5, 2C_3</b>  <b>Measures the achievement of outcome (b)</b>  "Needed" means financial needs for periodic maintenance of primary roads maintained by GOL funds for Public Sector Investment Projects (PSIP), based on prioritization done with HDM-4 in the One-Year Road Maintenance Program, as included in the Annual Road Maintenance Expenditure Program  "Met" means actual budget disbursed for periodic maintenance.  Challenges 1-2: see challenges 1-2 above.  For projects funded by Development Partners, the information is at the PFMU at MoFDP which makes data collection more time consuming. Looking only at PSIP projects will simplify the data collection for this indicator with the same quality of information.
<b>Outcome (c): Improved execution of emergency road maintenance</b>								

<sup>29</sup> The Results Framework included in the EDR is a draft and the evaluation team may revise it based on MCC feedback.

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
07	Average response time between the start and completion of emergency road maintenance works until the complete cut of a primary road is removed (and traffic can continue)	Hours (h)	Before start of emergency program. as baseline:  to be identified (2019)	to be identified (2022/2023)	Annually	Secondary sources (quantitative and qualitative) and/ or primary:  Depends on contracting modality that will be developed by the Office of the NRF with MPW and data availability	MPW for primary roads	<b>Used in Evaluation Questions 2B, 2B_2</b> <b>Measures the achievement of outcome (c)</b> The 5-Year NMRMP, para 3.3 states: "In time the Office of the NRF, together with the MPW, should develop a suitable contracting modality (for example, call-off contracts or framework contracts) whereby a contractor can be mobilized at short notice to respond to an emergency arising" – <b>Emergency program.</b> Once this suitable contracting modality is developed, it is suggested to use "the complete cut of a primary road" as an emergency incident and track the response time between a contractor's start and completion of the works, when the primary road can be used again.
<b>Outcome (d): Improved planning of routine road maintenance</b>								
09	Annual Road Maintenance Expenditure Program approved by the Inter-ministerial Steering Committee (IMSC) within four months following submission by MPW	Achieved, Not Achieved	First year of One-Year Road Maint. Progr. as baseline:  to be identified (2019)	to be identified (2022/2023)	Annually	Secondary sources (quantitative and qualitative):  IMSC publishes approval decision of MPW's Annual Road Maintenance Expenditure Program in Official Gazette  Annual Report of Office of the NRF	Office of NRF, IMSC MPW	<b>Used in Evaluation Questions 2B, 2B_2, 2B_5</b> <b>Measures the achievement of outcomes (d)-(f)</b> Annual Road Maintenance Expenditure Program submitted by MPW to the Office of the NRF for onward submission to the IMSC for approval and funding.  The NRF Act does not specify the deadline for the IMSC to approve the Annual Road Maintenance Expenditure Program. It states the following: "Responsible Agencies approved by government to undertake road maintenance works shall submit annual work programs to the Office of the Road Fund established in this Act for onward submission to the IMSC for approval and funding" (2016 NRF, para 2.4.4). Para 3.4.1 mentions that the IMSC shall hold regular meetings every 3 months or more frequently if business requires, as determined by the IMSC. <b>Definition:</b> <ul style="list-style-type: none"> <li><b>Achieved:</b> Annual Road Maintenance Expenditure Program submitted by MPW <b>should be approved by the IMSC four months before the start of the fiscal year (this is needed to allow for procurement so that maintenance can start at the beginning of the FY). This way we capture both the preparation of the plan and the timely approval.</b></li> <li><b>Not achieved:</b> Annual Road Maintenance Expenditure Program submitted by MPW is <b>not approved by IMSC approved by the IMSC four months before the start of the new fiscal year.</b></li> </ul>
<b>Outcome (e): Improved planning of periodic road maintenance</b>								
09	(same indicator as for Outcome d)							
<b>Outcomes (f): Improved planning of emergency road maintenance</b>								
10	Average response time between the time an emergency has been reported (e.g. complete cut of the road) and the start of the emergency road maintenance works	Hours (h)	Before start of emergency program. as baseline:  to be identified (2019)	to be identified (2022/2023)	Annually	Secondary sources (quantitative and qualitative) and/ or primary:  Depends on contracting modality that will be developed by the Office of the NRF with MPW and data availability	MPW for primary roads	<b>Used in Evaluation Questions 2B, 2B_2</b> <b>Measures the achievement of outcome (f)</b> The 5-Year NMRMP, para 3.3 states: "In time the Office of the NRF, together with the MPW, should develop a suitable contracting modality (for example, call-off contracts or framework contracts) whereby a contractor can be mobilized at short notice to respond to an emergency arising" – Emergency program Once this suitable contracting modality is developed, it is suggested to use "the complete cut of a primary road" as an emergency incident and track the response time between the notification about the emergency that the primary road was cut and the contractor's start of the works.
<b>Outcome (g): Strengthened capacities of GOL staff in planning of road network maintenance and improvement decisions</b>								
11	Average score of training participants pre-course assessments and post-course assessments from 6 trainings related to road	Score (from 1-5)	Pre-course assessment	Post-course assessment	Twice	Secondary sources (quantitative and qualitative): Training reports	VOLPE/ BAH	<b>Used in Evaluation Questions 2A, 2B_5, 2B_6, 2C_4</b> The difference between the aggregated average score for the pre-course assessments (baseline value) and the post-course assessments (endline value) will measure the average increase in capacities.

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
	network maintenance planning, using HDM-4		(baseline):  to be identified  (2016)	(endline): to be identified  (2022/2023)		Primary source (qualitative): KIIs with MPW staff from RMMU and IIU and with non-MPW RMMU/IIU staff from GOL	IDG Evaluation Team	<p><b>Note: The training reports have aggregate scores, summarizing the feedback from all training participants. This can be compiled into a total score for all trainings. There are no individual scores per training participant. The pre-course and post-course assessments required the participant only to give his/her function/ position. He/She was not required to mention from which organization he/she is from. Looking at the training report, it is not possible to distinguish between responses from private and public sector participants.</b></p> <p>From the list of participants, we can see which training participants is from MPW RMMU and IIU and which participants are from GOL, but not from MPW RMMU/ IIU. We can compile an aggregated list from all six trainings according to this disaggregation. This will be useful for the KIIs, were we can talk to a selected number of training participants from the two groups and get information for the disaggregation of indicator 11. The same applies to indicators 15 and 17.</p> <p>Secondary sources (quantitative and qualitative): There were 11 trainings (6 x trainings related to road maintenance planning (TR_RMP), 5 x related to data collection (TR_DC)). <b>The IDG Evaluation Team has received all training reports.</b></p> <p>The 2 x Training reports obtained so are from Volpe, Booz Allen Hamilton (BAH) working with local sub-contractors (Infrastructure Management and Engineering Services, Ltd. (IMES) and Liberia Renaissance Construction Company (LRRC).</p> <p><b>6 x Trainings which are relevant to measure this indicator were identified</b> among the documents received so far by Volpe and Booz Allen Hamilton (BAH):</p> <ul style="list-style-type: none"> <li>• <b>TR_RMP_01: HDM-4 General Training, 5-days (Day 1-5), 01/2018</b>, with 36 attendants of which 26 from MPW (including 7 from IIU and RMMU under IIU), 2 from University of Liberia, 1 from SMP, 3 from other donors: 2 from GIZ, 1 from USAID; <u>Obtained:</u> Training report dated March 16, 2018; Presentations dated December 2017.</li> <li>• <b>TR_RMP_02: HDM-4 Specific Training, 4-weeks, 01-02/2018</b>, with 13 participants, all MPW, including IIU/ RMMU; <b>plus a 2-day train-the-trainer HDM-4 training</b> for 4 MPW staff (of which 3 from IIU) to become future HDM-4 instructors. <u>Obtained:</u> Training report dated March 16, 2018.</li> <li>• <b>TR_RMP_03: HDM-4 Level 2 RDWE Model Calibration Training, 5-days (Day1-5), 06/2019</b>, with 14 attendants of which 6 from MPW (including 5 from IIU), 3 from NRF, 1 from MCA-L, 2 from LRRC. <u>Obtained:</u> Training report dated August 2019; Attendants lists, pre- and post-course assessments, presentations dated June 2019.</li> <li>• <b>TR_RMP_04: RUE Calibration Training, 5-days (Day 6-10), 07/2019</b>, with 12 attendants of which 8 from MPW (including 3 from IIU), 1 from NRF, 1 from MCA-L, 2 from LRRC. <u>Obtained:</u> Training report dated August 2019; Attendants lists, pre- and post-course assessments, presentations dated July 2019.</li> <li>• <b>TR_RMP_05: Introduction to HDM-4 Training, 3-days (Day 11-13), 07/2019</b>, with 14 attendants of which 8 from MPW (including 3 from IIU), 3 from NRF, 1 from MCA-L, 2 from LRRC. <u>Obtained:</u> Training report dated August 2019; Attendants lists, pre- and post-course assessments, presentations dated July 2019.</li> <li>• <b>TR_RMP_06: Strategic Planning and Road User Charges Training, 4-days (Day 15-18), 07/2019</b> with 15 attendants of which 8 from MPW (including 3 from IIU), 4 from NRF, 1 from MCA-L, 2 from LRRC. <u>Obtained:</u> Training report dated August 2019; Attendants lists, pre- and post-course assessments, presentations dated July 2019.</li> </ul> <p><b>Manuals available: Manual on Road Maintenance Planning (05/2019),</b> KII (Primary source qualitative): MPW/ IIU will provide us with list of MPW staff from the RMMU and IIU trained in road network maintenance planning, using HDM-4, who we can interview in KIIs. This indicator is a separate indicator for the RMMU and IIU staff, because they are responsible for preparing the 5-Year NMRMP and the One-Year Maintenance Program.</p>
Outcome (h): Road maintenance programming – with prioritized maintenance projects – prepared by MPW								

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
12	First One-Year RMP 2019 prepared by MPW uses HDM-4 as decision support model for prioritizing periodic road maintenance projects	Yes/ No	No (2016)	Yes (2019)	1x (2019)	Secondary sources (quantitative and qualitative):  One-Year RMP as submitted by MPW to the Office of NRF	MPW IIU	<b>Used in Evaluation Questions 2A, 2B_6, 2C_1, 2C_2</b> MPW prepares the One-Year Road Maintenance Program. It is extracted from 1 <sup>st</sup> year of NMRMP 2019-2023 and data would be updated in the decision support models if data collection and addition of data to the RAMS goes as planned (see Outcome 11); Decision support models used for prioritizing: - routine maintenance is ROMAPS; - periodic maintenance is HDM-4; (if everything goes according to plan, RAMS will house the data that will feed into ROMAPS and HDM-4). <i>Note: At the baseline (2016), MPW did not use HDM-4 as it did not have the HDM-4 software licenses nor would the responsible staff have had the skills to use HDM-4. Before MCC, there was a random list of maintenance projects.</i> Status 08/2019: The first One-Year Road Maintenance Program is under preparation.
13	Five-Year NMRMP 2019-2023 prepared by MPW uses HDM-4 as decision support model for prioritizing periodic road maintenance projects	Yes/ No	No (2016)	Yes (2022/2023)	1x (2022/2023)	Secondary sources (quantitative and qualitative):  5-Year NMRMP as submitted by MPW to the Office of NRF	MPW IIU	<b>Used in Evaluation Questions 2A, 2B_6, 2C_1, 2C_2</b> MPW prepares the 5-Year NMRMP 2019-2023. Status 08/2019: The first One-Year Road Maintenance Program is under preparation. Data need to be updated in the decision support models if data collection and addition of data to the RAMS goes as planned (see Outcome 11); Decision support models used for prioritizing: - routine maintenance is ROMAPS; - periodic maintenance is HDM-4; (if everything goes according to plan, RAMS will house the data that will feed into ROMAPS and HDM-4).
<b>Outcome (i): Maintenance projects prioritized under the MPW's road maintenance plans approved by NRF</b>								<b>Used in Evaluation Questions 2A, 2C_1, 2C_2</b>
14	Share of <u>periodic maintenance projects</u> in the One-Year Road Maintenance Program of MPW which are budgeted in the Annual Road Maintenance Expenditure Program of the NRF	Percent (%)	to be identified (2016)	to be identified (2022/2023)	Annually	Secondary sources (quantitative and qualitative):  One-Year Road Maintenance Program as submitted by MPW to Office of NRF  Annual Road Maintenance Expenditure Program of NRF prepared by the Office of NRF as submitted to IMSC  Annual Report of the NRF	MPW IIU      Office of the NRF	<b>Used in Evaluation Questions 2A, 2C_1, 2C_2</b> Budget allocated to periodic maintenance in Annual Road Maintenance Expenditure Program by Budget needed for periodic maintenance in One-Year Road Maintenance Program as identified with HDM-4.
<b>Outcome (j): Strengthened capacities of GOL to consistently collect standardized data on (i)-(iii)*</b>								
15	Average score of training participants pre-course assessments and post-course assessments from 5 trainings related to <u>collecting standardized data on (i)-(iii)*</u>	Score (from 1-5)	Pre-course assessment (baseline):  to be identified (2016)	Post-course assessment (endline):  to be identified (2022/2023)	Twice	Secondary sources (quantitative and qualitative): Training reports  Primary source (qualitative): KIIs with MPW staff from RMMU and IIU and with non-MPW RMMU/IIU staff from GOL	VOLPE/ BAH      IDG Evaluation Team	<b>Used in Evaluation Questions 2A, 2C_4</b> Standardized data on (i)-(iii)* area data on (i) traffic on primary and secondary roads by dry and wet season, (ii) road and bridge and culvert inventory on primary network, and (iii) condition assessment on primary roads (not bridges).  The difference between the aggregated average score for the pre-course assessments (baseline value) and the post-course assessments (endline value) will measure the average increase in capacities.  <i>Note: The training reports have aggregate scores, summarizing the feedback from all training participants. This can be compiled into a total score for all trainings. There are no individual scores per training participant. The pre-course and post-course assessments required the participant only to give his/her function/ position. He / She was not required to mention from which organization he/she is from. Looking at the training report, it is not possible to distinguish between responses from private and public sector participants.</i>  From the list of participants, we can see which training participants are from MPW RMMU and IIU and which participants are from GOL, but not from MPW RMMU/ IIU. We can compile an aggregated list from all six trainings according to this disaggregation. This will be useful for the KIIs, were we can talk to a selected number of training participants from the two groups and get information for the disaggregation of indicator 15. The same applies to indicators 11 and 17.

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
								<p>Secondary sources (quantitative and qualitative): There were 11 trainings (6 x trainings related to road maintenance planning (TR_RMP), 5 x related to data collection (TR_DC)). <b>The IDG Evaluation Team has received all training reports.</b></p> <p><b>5 x Trainings which are relevant to measure this indicator were identified</b> among the documents received by Volpe and Booz Allen Hamilton (BAH) (Status: Sept. 05, 2019):</p> <ul style="list-style-type: none"> <li><b>TR_DC_01: Manual Count Training, 2-days, 03/2017,</b> with 57 attendants of which 34 from GOL: 12 from MPW (including X from IIU and RMMU under IIU), 17 from LISGIS and 5 from MoT; and 23 from LRRC and ACEPSI. <u>Obtained:</u> Training report dated April 14, 2017; Presentation Manual Traffic Count Training dated March 2017.</li> <li><b>TR_DC_02: Automated Count Training, 1-day, 04/2017,</b> with 22 attendants of which 12 from GOL: 8 from MPW (including ? from IIU and RMMU under IIU) and 4 from LISGIS; and 10 from LRRC and ACEPSI. <u>Obtained:</u> Training report dated April 14, 2017.</li> <li><b>TR_DC_03: Manual Count – Wet Season Training, 1-day, 06/2017,</b> with 24 attendants of which 14 from GOL: 9 from MPW (including X from IIU and RMMU under IIU), 5 from LISGIS; and 10 from LRRC and ACEPSI. <u>Obtained:</u> Training report dated June 20, 2017, Presentation Wet Season Manual Traffic Count Training dated June 2017.</li> <li><b>TR_DC_04: Network Inventory and Roadway Condition Assessment Training, 5-days, 06/2018,</b> with 19 attendants of which 18 from MPW national and county level (including 2 from IIU/ RMMU, 5 from IIU, 4 from MPW other, 7 Resident Engineers from the counties), 1 from LRRC. <u>Obtained:</u> Training report dated August 17, 2018; Presentations dated June 2018.</li> <li><b>TR_DC_05: Road User Cost Survey Training, 5-days, 07/2018,</b> with 13 attendants, 6 from MPW (all IIU/ RMMU), 7 from LRRC. <u>Obtained:</u> Training report dated August 31, 2018; Presentations dated June 2018.</li> </ul> <p>According to 5-Year NMRMP and the One-Year Road Maintenance Program, 2.5% of NRF funds are supposed to be set aside for data collection. MPW wants to build in-house data collection capacities first, but also uses universities and local contractors to collect data.</p> <p><b>5 x Manuals available: Traffic count manual</b> (Volpe Center, Booz, Allen, Hamilton, 10/2017); <b>Manual Traffic Count Training</b> (03/2017); <b>Wet Season Manual Traffic Count Training</b> (06/2017); <b>Procedures of Network Inventory and Roadway Condition Assessment</b> (Volpe Center, 02/2019); <b>Manual on Conducting Bridge Condition Assessments</b> (Volpe, 04/2019);</p> <p>KII (Primary source qualitative): MPW/ IIU will provide us with list of MPW staff who participated in Volpe training on data collection, who we can interview in KIIs.</p>
<b>Outcome (k): Consistent collection of standardized data by GOL on (i)-(iii)*</b>								
16	Actual data collection performed in line with Annual Expenditure Road Maintenance Program for standardized data on (i)-(iii)*	Achieved, Partially Achieved, Not Achieved	First year of Annual Road Maint. Exp. Progr. as baseline:  to be identified (2019)	  to be identified (2022/2023)	Annually	<p>Secondary sources (quantitative and qualitative):</p> <p>5-Year NMRMP, One-Year Road Maintenance Program</p> <p>Annual Road Maintenance Expenditure Program of NRF prepared by the Office of NRF as submitted to IMSC</p> <p>Data collection report(s), databases with datasets</p>	MPW Planning Department or RMMU  The Evaluation Team will need to confirm if the Directorate for M&E is involved	<p><b>Used in Evaluation Questions 2A, 2C_2, 2C_4</b></p> <p>Standardized data on (i)-(iii)*: (i) traffic on primary and secondary roads by dry and wet season, (ii) road and bridge and culvert inventory on primary network, and (iii) condition assessment on primary roads (not bridges)</p> <p>2.5% of NRF funds set aside for data collection. MPW wants to build in-house data collection capacities first, but also uses universities and local contractors.</p> <p>Secondary sources (quantitative): see Indicator 11 for available secondary sources.</p> <p>The 5-Year NMRMP and the One-Year Road Maintenance Program specify the needs for the data collection by types (i)-(iii). The Annual Expenditure Road Maintenance Program has a budget line for data collection. If data were collected according to this, there should be evidence, for example, a data collection report and a database with updated datasets.</p> <p><b>Definition:</b></p> <ul style="list-style-type: none"> <li>Achieved: More than 80% of the planned data collection was performed. The rate applies to the percentage of the network for which all data have been collected.</li> </ul>

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
								<ul style="list-style-type: none"> <li>Partially Achieved: (tbd) Less than 80%, but more than 50% of the planned data collection was performed. The rate applies to the percentage of the network for which all data have been collected.</li> <li>Not Achieved: (tbd) Less than 50% to 0% of the planned data collection was performed. The rate applies to the percentage of the network for which all data have been collected.</li> </ul>
<b>Outcome (l): Strengthened capacities of GOL to add collected data on (i)-(iii)* to the RAMS</b>								
17	Average score of training participants pre-course assessments and post-course assessments from 5 trainings related to <u>adding standardized data on (i)-(iii)*</u> onto the RAMS	Percent (%)	Pre-training baseline: to be identified (2016)	to be identified (2022/2023)	Twice	No secondary sources available for this. Primary source (qualitative): KIIs with MPW staff from RMMU and IIU and with non-MPW RMMU/IIU staff from GOL	IDG Evaluation Team	<p><b>Used in Evaluation Questions 2A, 2C_4</b></p> <p>Standardized data on (i)-(iii)* with data on (i) traffic on primary and secondary roads by dry and wet season, (ii) road and bridge and culvert inventory on primary network, and (iii) condition assessment on primary roads (not bridges)</p> <p><i>Note: The training reports have aggregate scores, summarizing the feedback from all training participants. This can be compiled into a total score for all trainings. There are no individual scores per training participant. The pre-course and post-course assessments required the participant only to give his/her function/ position. He / She was not required to mention from which organization he/she is from. Looking at the training report, it is not possible to distinguish between responses from private and public sector participants.</i></p> <p>KII (Primary source qualitative): From the five training reports listed under indicator 15, we will select GOL staff who participated in the trainings TR_DC_01 to TR_DC_05, disaggregate them by staff from MPW RMMU/ IIU and non-MPW RMMU/ IIU staff from GoL. They will be interviewed to which extent the trainings increased their capacities to add data onto the RAMS, using the same scoring system as Volpe/BAH used (score 1-5) for the pre-course and post-course assessments.</p>
<b>Outcome (m): Routinely addition of collected data on (i)-(iii)* to RAMS by GOL</b>								
18	Data uploaded to RAMS according the RAMS plan	Achieved, Substantially Achieved, Partially Achieved, Not Achieved	First year of One-Year Road Maint. Progr. as baseline: to be identified (2019)	to be identified (2022/2023)	Twice	<p>Secondary sources (quantitative and qualitative):</p> <p>5-Year NMRMP</p> <p>One-Year Road Maintenance Program</p> <p>Annual Road Maintenance Expenditure Program of NRF prepared by the Office of NRF as submitted to IMSC</p> <p>Data collection report(s)</p> <p>RAMS with consolidated, updated datasets</p> <p>Primary source (qualitative):</p> <p>KIIs with MPW staff</p>	IDG Evaluation Team with MPW	<p><b>Used in Evaluation Questions 2A, 2C_2, 2C_4</b></p> <p>Standardized data on (i)-(iii)* with data on (i) traffic on primary and secondary roads by dry and wet season, (ii) road and bridge and culvert inventory on primary network, and (iii) condition assessment on primary roads (not bridges).</p> <p>KII (Primary source qualitative): MPW staff who add/ upload data on to the RAMS will be interviewed if all data collected were uploaded onto the RAMS according to plan.</p>
<b>Critical assumptions (CA) for the project</b>								
CA1	Office of the NRF is staffed	Number of staff			Annually	<p>Secondary sources (quantitative):</p> <p>2016 NRF Act</p> <p>Financial Plan of the NRF as approved by IMSC</p> <p>Annual Report of the NRF</p>	Office of the NRF	<p>Secondary sources (quantitative):</p> <p>Comparing the number of staff and their roles and responsibilities as planned and actual. The 2016 NRF Legal Act, Chapter 4, describes the staffing of the Office of the NRF. "The staffing must be in accordance with the provisions of the financial plan which has been approved by the IMSC." - We will check of the staffing is in accordance with the provisions of the financial plan of the NRF as approved by the IMSC.</p>

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
CA2	Funds allocated in NRF to road maintenance are used for road maintenance	Percent (%)			Annually	Secondary sources (quantitative): 2016 NRF Act Annual Report of the NRF Annual Budget Execution Reports of MoFDP since 2019	Office of the NRF MoFDP	Secondary sources (quantitative): The NRF is “for the purpose of financing road and bridge maintenance works and directly associated planning, programming and management activities” (para 1.2.1). According to the 2016 NRF Act, not less than 60% of the NRF shall be spend on maintenance works. Para 6.1.d: “Rehabilitation and improvement works including paving of roads to a maximum of 40% of its annual revenues only through servicing of loans approved by Government (...)”.
CA3	Periodic road maintenance projects are prioritized by EIRR	Yes/ No			Annually	Secondary sources (quantitative and qualitative): 5-Year NMRMP, One-Year Road Maintenance Program, Data from MPW/ Construction Bureau/ Highway and Maintenance Annual Expenditure Road Maintenance Program	MPW RMMU MPW Construction Bureau Office of the NRF	Secondary sources (quantitative and qualitative): Periodic road maintenance is prioritized by Economic Internal Rate of Return (EIRR), based on HDM-4.
CA4	Sufficient funding allocated by GOL to data collection	Percent (%)			Annually	Secondary sources (quantitative and qualitative): 5-Year NMRMP, One-Year Road Maintenance Program Annual Expenditure Road Maintenance Program	MPW RMMU Office of the NRF	<b>Used in Evaluation Question 2B_6</b> The 5-Year NMRMP and the One-Year Road Maintenance Program state that 2.5% of the budget should be allocated annually for data collection. In the Annual Expenditure Road Maintenance Program it can be seen whether 2.5% of the budget were allocated. If the 2.5% were indeed allocated as foreseen, then it is considered “sufficient”.
CA5	Training and other capacity strengthening efforts resulted in willingness of GOL staff to apply the know-how in planning and execution of road maintenance projects	--			Twice	Primary source (Qualitative): KIIs with MPW and NRF staff	IDG Evaluation Team with MPW and Office of the NRF	<b>Used in Evaluation Question 2C_5</b> Primary source (Qualitative): KIIs with MPW and NRF staff to understand if there was a willingness to apply the know-how (and which factors may have hindered an application of the know-how).
CA6	Performance-based periodic road maintenance contracts implemented as scheduled:	Percent (%)			Annually	Secondary sources (quantitative and qualitative): PFMU at MoFDP	MPW Finance Division	<b>Used in Evaluation Question 2B_4</b> Definition: (Original contract costs for OPRC contracts - amount paid for OPRC contracts) / original contract costs for OPRC contracts For projects funded by Development Partners, the information is at the PFMU at MoFDP which makes data collection more time consuming. The World Bank started the OPRC regime (Output Performance Based Road Contract), and then the EU also got involved. MCC is not working in this. The World Bank and the EU fund Performance Based Routine Maintenance Contracts with Periodic Maintenance.
CA7	Sufficient funding allocated to road maintenance: Share of optimal financial road maintenance needs in 5-Year NMRMP for maintenance works that were met with budget disbursed	Percent (%)			Annually,5-Year	Secondary sources (quantitative and qualitative): 5-Year National Medium-Term Road Maintenance Plan (NMRMP 2019-2023) of MPW Annual Budget Execution Reports of MoFDP since 2019	MPW MoFDP	<b>Used in Evaluation Questions 2B_6, 2C_3</b> “Optimal financial needs” means total financial needs identified in Five-Year NMRMP for routine, periodic, emergency road maintenance works “Financial needs met” means actual budget disbursed for routine maintenance works, aggregated from five Annual Budget Execution Reports of MoFDP. Challenges 1-2: see challenges 1-2 above.

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
CA8	Good coordination of GOL with donors in Roads sector	Achieved, Partially Achieved, Not Achieved			Twice	Secondary sources (quantitative and qualitative): Agenda, Participants list, (minutes of meetings, if available) of donor coordination meetings  Primary sources (qualitative): KIIs	MPW Aid Coordinator  IDG Evaluation Team with MPW	<b>Used in Evaluation Questions 2B_6, 2C_3</b>  There is an Infrastructure Technical Working Group for the Liberia PAPD, chaired by MPW. The MPW has an Aid Coordinator. There are monthly coordination meetings to which the donors in the Roads Sector are invited. MCA-Liberia holds two meetings per year for donor coordination (with donors, only).
<b>Beyond the project outcomes (A)-(G):</b>								
<b>Outcome (A): Changed annual average daily traffic</b>								<b>Used in Evaluation Question 3</b>
A1 <i>(former B1)</i>	Annual average daily traffic (AADT)	A1: normal A2: diverted A3: generated traffic (AADT)	to be identified (2019)	to be identified (2022/2023)	Annually	OD survey	MPW	<b>Used in Evaluation Question 3</b>
<b>Outcome (B): Prolonged life of road network</b>								<b>Used in Evaluation Question --</b>
B1 <i>(former C1)</i>	Network average IRI (proxy indicator)	International Roughness Index (IRI)	Weighted average of the IRI of the paved roads existing at baseline	IRI	Measured regularly (every year) for the same roads	International Roughness Index (IRI) calculations		<b>Used in Evaluation Question --</b> <b>Definition:</b> <ul style="list-style-type: none"> <li>An improved (lower) IRI is excellent</li> <li>An unchanged IRI is good</li> <li>Increased IRI is bad</li> </ul>
<b>Outcome (C): Decreased travel time</b>								<b>Used in Evaluation Question --</b>
C1 <i>(former D1)</i>	Travel time on selected maintained roads (from location a to location b)		Pre-Compact baseline:  to be identified (2015)	Post-compact endline:  to be identified (2022/2023)	Twice	Primary source (quantitative): Origin-Destination survey  Primary source (qualitative): Public Transport User survey  Roadside Establishment Interviews		<b>Used in Evaluation Question --</b> <b>Note:</b> MCC's contribution to the Matching Road Maintenance Fund is withheld, because of the GOL non-compliance with the pre-conditions for MCC's matching of funds. While the funds are withheld, road maintenance works for which MCC has matched the GOL funds are on hold. <b>How the locations will be identified:</b> We will ask drivers to estimate the travel time between the last major town located before the OD location (start location), and the location of the OD survey (end location). But we will need to be flexible and reexamine this for each OD survey location. <b>Origin-Destination survey (Primary source quantitative):</b> In addition to the standard O-D question required for HDM-4 (Origin and Destination, journey purpose, travel time, vehicle classification, passengers per vehicle, number of passengers in employment, number of crew, type and approximate weight of merchandise or goods transported), O-D questionnaire will collect additional elements including fares for transporting goods and people and motivations for the trip. O-D survey will also ask questions on any changes before and after road improvements if relevant to obtain information on Evaluation Area 3. O-D surveys were not done by MPW recently, not after rehabilitation. They are done project-wise, usually by consultants/ contractors prior to the planning. The latest O-D survey date 3-4 years back. There are no O-D surveys on a national level. <b>Public Transport User survey (Primary source qualitative):</b> Surveys conducted at Transport Centers (bus stations) in location a, b, and c (to be defined) where public buses depart. Surveyors will interview public transport users on the <i>tbd</i> road and ask questions on travel time, fares, motivation of trip, and any changes before and after the road improvement <b>Roadside Establishment Interviews (Primary source qualitative):</b> Interviews conducted with residents and commuters at prominent roadside establishments in location a, b, and c (to

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
								be defined). The interviews will ask questions on any changes before and after the road improvement.
<b>Outcome (D): Decreased vehicle operating costs</b>								<b>Used in Evaluation Question --</b>
D1 (former E1)	Vehicle operating costs on maintained roads				One-off	Primary source (quantitative): New VOC survey: (i) ask road users how much their VOC  Secondary source: (ii) use HDM4 VOC model to calculate cost savings according to the reduction of the road roughness IRI, and based on the number of vehicles that use the road.		<b>Used in Evaluation Question --</b> <b>Note:</b> MCC's contribution to the Matching Road Maintenance Fund is withheld, because of the GOL non-compliance with the pre-conditions for MCC's matching of funds. While the funds are withheld, road maintenance works for which MCC has matched the GOL funds are on hold.
<b>Outcome (E): Improved quality of road network</b>								
E1 (former F1)	Share of road network in excellent, good, or fair, poor, and very poor condition of total classified paved roads	Percent (%)	excellent: 70.4 good: 15.8 fair: 7.4 poor: 3.5 very poor: 2.8 (2016)	excellent: ___ good: ___ fair: ___ poor: ___ very poor: ___ (2022/2023)	? Every 2 years?	Secondary sources (quantitative):  2016 World Bank Nationwide Road Inventory Survey (published in 2018)  To be updated with data from 2019 report.	MPW RMMU  MPW M&E Directorate	<b>Used in Evaluation Question 2B_7</b>  Secondary sources (quantitative):  Iimi, Atsushi, and Kulwinder Rao (2018): <b>Spatial Analysis of Liberia's Transport Connectivity and Potential Growth</b> . International Development in Focus. Washington, DC: World Bank, based on data collected in the <b>May 2016 Nationwide Road Inventory Survey</b> for which a smartphone application (RoadBump) was used. According to the 2016 survey the road network has 11,423 km of roads, of which 565 km are paved and 10,857 km unpaved. 565 km are primary paved roads.  According to the <b>Liberia Pro-Poor Agenda for Prosperity and Development (PAPD) 2019-2023 (p. 58)</b> : "Liberia has approximately 11,536 kilometers (km) of primary, secondary, urban and feeder roads. These comprise about 1,899, 2,479 and 6,263 km of unpaved primary, secondary and feeder roads respectively. Approximately 622 km of the total are paved roads." (Data source is not given in the PAPD document.)  MPW is currently consolidating data of a <b>new Nationwide Road Inventory Survey</b> and will then analyze them. MPW offered to share an <b>interim report</b> with the IDG Liberia Roads Evaluation Team. The Final spatial analysis report 2019 will have the percentage of road network in excellent, good, or fair condition for the year 2018/19 (period needs to be confirmed once the interim report is received)
<b>Outcome (F): GOL increases maintenance spending</b>								
F1	Funds allocated in NRF to road maintenance	USD	0 (2016)	(2022/2023)	Annually	Annual Report of the NRF  Annual Budget Execution Reports of MoFDP since 2019	Office of the NRF  MoFDP	<b>Used in Evaluation Question 2B_3, 2C_7</b>  Secondary sources (quantitative and qualitative)
<b>Outcome (G): Increased spending for prioritized road maintenance</b>								
G1 (former G)	Share of funds allocated in NRF to road maintenance	Percent (%)	0  Random list of maintenance projects with no funds allocated based on	Not less than 60 (2022/2023)	Annually	2016 NRF Act  Annual Report of the NRF  Annual Budget Execution Reports of MoFDP since 2019	Office of the NRF  MoFDP	<b>Used in Evaluation Question 2B_3, 2C_7</b>  Secondary sources (quantitative and qualitative):  The NRF is "for the purpose of financing road and bridge maintenance works and directly associated planning, programming and management activities" (para 1.2.1).  According to the 2016 NRF Act, not less than 60% of the NRF shall be spend on maintenance works.  Para 6.1.d: "Rehabilitation and improvement works including paving of roads to a maximum of 40% of its annual revenues only through servicing of loans approved by Government (...)"

No.	Indicator	UoM	Baseline	Endline	Frequency	Data sources & methodology	Responsibility	Description / comments
			prioritization, because no decision support models were used (2016)					

## **4.2 TIMEFRAME OF EXPOSURE**

### **Evaluation Question 0**

Time frame of exposure is not relevant for Evaluation Question 0. However, the evaluation team will conduct endline data collects towards the end of the Compact to ensure that the evaluation team can meet with key stakeholders while they are still actively working for the Compact.

### **Evaluation Question 1**

Based on the program logic, the evaluation team expects RMMU to allocate maintenance funds with a data-driven maintenance plan at the beginning of the next fiscal year after receiving the training on road network maintenance planning and the use of HDM-4. These trainings were completed in July 2019 and the evaluation team can expect that the benefits will start accruing in July 2020, which is the start of the next fiscal year after July 2019. Any sustainable commitment from the GOL to road maintenance would be observed from records after the Compact completion (after January 2021). The timing of the endline data collection will be decided after observing the budget allocation in July 2021 (and/or July 2022). Depending on whether the budget allocation is done according to the prioritized maintenance plan, data collection might be conducted in August 2022 or August 2023. Therefore, the exposure period might range between 25 to 37 months, counting from July 2020 to August 2022/2023.

### **Evaluation Question 2**

The evaluation team can expect that the benefits of maintenance training started accruing on July 2019, which is when the HDM-4 trainings were completed. Therefore, the time frame of exposure for Evaluation Question 2 will vary depending on the timing of the endline. The exposure period ranges from 37 to 49 months depending on whether the endline data collection is conducted in 2022 or 2023.

### **Evaluation Question 3**

The benefits of improved periodic maintenance will be experienced immediate after the periodic maintenance is completed. The evaluation team believes that two years after the completion of periodic maintenance will provide sufficient time for change the road patterns of the improved roads. Given that it is unclear when the road maintenance works will begin, the exposure period may change depending on the timeline of periodic maintenance planning.

### **Evaluation Question 4**

Similar to Evaluation Question 3, the evaluation team expects that two years after the completion of the periodic maintenance will provide sufficient time for changes to take place in transportation costs. However, the exact exposure period will depend on when the road maintenance works are completed.

## **4.3 CHALLENGES AND RISKS TO THE STUDY DESIGN**

### **Evaluation Question 0**

Secondary data sources are essential for answering Evaluation Question 0. There is a risk that these documents may not be available to the evaluation team due to delay in locating the documents, loss of past records, or unwillingness of the stakeholders to share sensitive information. The team

will establish a system with the MCA to obtain documents relevant to the implementation of the Roads Project. We will aim to obtain these documents as they are cleared for circulation. The type of documents the evaluation team would need are: quarterly progress reports, M&E indicator progress reports, any reports developed by Volpe and their subcontractors, and any other reports that are developed by beneficiaries as a result of MCC support. However, even when the documents are available to the team, the documents may be an inaccurate representation of the actual practice.

### **Evaluation Question 1**

Benefits associated with technical assistance projects are not often quantified in monetary terms using HDM-4. The analysis uses simulated scenarios in generating the outputs and therefore conclusion drawn may be indicative of the cost effectiveness and may not be considered equivalent to a rate of return in an investment project.

In addition, benefits of technical assistance are wide ranging and depend on the institutional actions taken by the beneficiary institution(s). In other words, the technical assistance by itself cannot generate benefits without the sustained institutional actions by the benefiting institution. These benefits are generally difficult to identify and estimate, and they are generally the result of contributions from several complementary activities and investments.

### **Evaluation Question 2**

In addition to the risks mentioned under Evaluation Question, attribution of changes to the Project will be a major challenge and a limitation to the interpretation of the results.

An additional risk is gathering accurate information from KIIs that the evaluation team cannot corroborate with data and/or documents. Interviewees may have biases and/or incentives to skew the information provided to the team. To minimize against these risks the team will interview relevant institutional stakeholders for road maintenance in order to validate information from multiple perspectives.

### **Evaluation Question 3**

First, the most significant challenge is detecting any measurable difference in road user experience before and after periodic maintenance works. Once rehabilitations/reconstructions are completed, road users are likely going to experience measurable change in their road usage. However, periodic maintenance improves road conditions from “fair” to “good” and this improvement, though more cost-effective, may not result in a measurable difference in road user experience. Furthermore, road pattern changes are not likely detectable before and after periodic maintenance works.

Second, selection of roads that will receive periodic maintenance as a result of MCC’s Matching Road Fund may be difficult, especially since the MPW’s selection of periodic maintenance roads is unclear. Selection of roads is critical to addressing EQ 3 and may be only possible by making several assumptions on road maintenance.

Third, there is a risk of insufficient or unrepresentative samples. O-D surveys by their nature provide short-term snapshots of road usage and representativeness can be difficult to assess. Inevitably, the data collected will form a sample of the usage of the project roads. The evaluation team will ensure that the samples obtained are both sufficient in size, dictated by duration of survey and sample rate, and representative of usage of the roads being surveyed as much as possible.

### **Evaluation Question 4**

There is a risk that the interviewees will not provide accurate information, especially because Evaluation Question 4 is related to the transportation costs, which can be sensitive information in case of informal/illegal transportation services; for example:

- The interviewee may provide information they believe the interviewer wants to hear, rather than more accurate information they believe is not desired;
- The interviewer may withhold, or even provide misleading information, to protect sensitive or proprietary information; and
- The interviewee may not trust the intentions of the evaluation team.

## V. EVALUATION DESIGN – EVALUATION AREA 0: PROJECT IMPLEMENTATION

*Evaluation Question 0: To what extent did the Project have a clear plan? Was it implemented according to plan? Where there any deviations from the original design? If so, deviations and the overall evolution should be documented to the greatest extent possible.*

### 5.1 EVALUATION QUESTION 0 METHODOLOGY

#### 5.1.1 Methodology

Evaluation Question 0 is an ex-post evaluation, aimed at informing the evaluation as a whole. Within the Theory of Change model, Evaluation Area 0 examines the contribution of MCC's investment to the key outputs as shown in Figure II.2. Evaluation Area 0 will allow the team to understand how the project was implemented and whether any deviations occurred, between original and final design, and between design and the implementation. The information from Evaluation Area 0 will inform other Evaluation Areas, ensuring that they assess works and activities as implemented, rather than as they were envisaged at baseline.

First, the team will examine how the MCC Compact was designed and what the intended results and processes were. This helps the team to understand the original plan of the project and whether the design was in alignment with the local conditions and international standards. Second, the evaluation team will monitor the implementation of the Project to document any deviations from the original design. The information obtained to answer the evaluation question will provide the team with a clear foundation to assess other evaluation areas.

#### 5.1.2 Detailed Secondary Data Collection Methodology

##### 5.1.2.1 Baseline Data Collection

The baseline data is available from the Project design documentation (including the original work plan). Secondary data for the baseline were made available to the team by MCC prior and during the first trip to Liberia.

##### 5.1.2.2 Endline Data Collection

**Description of Methodology:** The evaluation team will continue to review secondary data from various sources to address Evaluation Question 0. The team has reviewed documents provided by the MCC and other stakeholders. IDG will continue to obtain additional secondary data regarding the project and review them to fully understand how the project was implemented. Any deviations from the initial Compact design will be noted and discrepancies between available information will be highlighted to be confirmed during the evaluation. Endline data will be collected once towards the end of the Compact (September/October 2020) to coincide with other data collection events conducted during the same period. However, since the proposed endline data collection does not capture the last two-three months of implementation, the evaluation team will request and review additional secondary sources when conducting EQ 1 endline data collection in 2022 or 2023 to review any progress done during the last two/three months of implementation.

**Data Processing/ Data Analysis:** Based on the secondary data collected and the qualitative data collected, the team will evaluate how the Roads Project was implemented and the changes made

during implementation. The team will review the rationale for the initial project design and the changes made during implementation to assess whether the modifications were well supported with evidence.

### 5.1.3 Detailed Primary Data Collection Methodology - KIIs

**Table V-i Primary Data Collection Summary Table for Evaluation Question 0**

Data collection	Timing	Sample Unit/ Respondent	Sample Size	Relevant Instruments	Exposure Period
KIIs	Combined with KIIs for other EQs (2020) (endline)	Key stakeholders of Roads Project	20	Semi-structured interviews	Less than three years

#### 5.1.3.1 Baseline Data Collection

The baseline data collection is not applicable. Baseline data can be found in the original Project design documentation (including the original work plan).

#### 5.1.3.2 Endline Data Collection

**Description of Methodology:** The team conducted interviews with key stakeholders during the initial trip to Monrovia. Throughout the evaluation process, the team will continue to engage with relevant stakeholders to carry out the other evaluation areas. Based on the interviews already conducted and the additional interviews to be held for the other evaluation areas, the team will gather information that may be helpful to understand the project implementation and the decision-making process that went into changing the original design.

**Sample Units:** N/A

**Target Respondents:** Key stakeholders of the Roads Project.

**Sample Size and Assumptions:** 20

**Sample Frame:** The sample frame is comprised of: MCC Washington staff; MCA-L staff; officials from the MPW [e.g. Policy and Planning Department, IIU including the RMMU, Finance Division, Construction Bureau, M&E Directorate, Procurement Unit, Donor Coordination Unit, and Resident Engineers based in the counties]; officials from the Office of the National Road Fund; officials from the Ministry of Finance and Development Planning (MoFDP), MoT, and LISGIS; road maintenance firms (implementors of maintenance works); donors active in the roads sector (e.g. World Bank, USAID, GIZ, EU, JICA, SIDA, AfDB), because of synergies of their support; as well as Volpe, and BAH (Roads Project implementors).

**Sampling Strategy:** Informants will be selected based on their role in the Project and their involvement in the roads sector in Liberia.

**Instruments/Equipment:** Semi-structured interviews based on an Excel-template with questions.

**Rounds and Timing:** Combined with additional interviews for other evaluation areas (preferably in 2020, close to the end of the Compact).

**Location:** Monrovia and selected counties in Liberia, and Washington.

**Staffing:** The KIIs will be conducted by the evaluation team and no additional staffing is anticipated for this evaluation area. The Team Leader will lead the data collection procedure to conduct KIIs with key stakeholders in Liberia, supported by the In-Country Coordinator.

**Safety Procedures/Precautions:** N/A

**Data Quality:** While the Team Leader leads the KIIs and takes notes, the In-Country Coordinator will assist by taking notes that will be used to cross-reference with the notes taken by the Team Leader. The In-Country Coordinator will transcribe the audio recording into English and the transcripts will be corrected by the Team Leader.

**Data Processing:** All KIIs will be audio recorded on digital voice recorders and transcribed by the In-Country Coordinator and reviewed by the Team Leader.

**Data Analysis:** The KII transcripts will be coded by the Junior Analyst with the guidance from the Team Leader. Responses will be coded using the MS Excel template with KII questions in a consistent manner to answer the questions.

## **VI. EVALUATION DESIGN – EVALUATION AREA I: ENGINEERING ANALYSIS AND ECONOMIC MODEL**

*Evaluation Question 1: What is the economic return of the road maintenance investments? What factors drove changes to the ERRs over time? How could the project have been designed to result in a higher ERR?*

### **6.1 EVALUATION QUESTION I METHODOLOGY**

#### **6.1.1 Methodology**

Economic return refers to a quantitative value that is conventionally expressed in two key indicators: Net Present Value (NPV) and Economic Rate of Return (ERR). The ERR for the evaluation of a road maintenance investment is assessed by comparing the periodic maintenance and recurrent routine maintenance costs against the benefits of the project road on its users over the analysis period (determined at the appraisal stage, usually 10-20 years).

With the change in the scope of the Roads Project, the CBA conducted as part of the evaluation will be limited to the Roads Sector Reform Activity. This activity involves road sector reform aimed at building capacity and providing technical assistance at the national level to develop and implement road network data collection and a road asset management system. The activity also includes staff training to update and use the system for maintenance planning. The purpose of the CBA of the Roads Sector Reform Activity is to assess whether MCC's investment in capacity building and technical assistance resulted in an acceptable investment outcome in terms of quantifiable economic benefits to the society.

The main achievements of the Roads Sector Reform Activity are (1) several MPW staff and road sector professionals were trained in HDM-4 analysis and data collection, (2) HDM-4 model calibration for Liberia was conducted, (3) the periodic maintenance component of the five-year and annual road maintenance plan using HDM-4 was prepared by the RMMU staff trained under the activity. Overall, the activity aims to improve the capacity within the MPW (RMMU) to prepare road maintenance plans using HDM-4, leading the path to efficient allocation of maintenance resources which will support sustainable road maintenance in the long term. The approval and implementation of the maintenance plans over the years will maximize the net economic benefits to the country by reducing vehicle operating costs on maintained roads and improve network sustainability. Without data collection and maintenance planning, the budget allocation will be driven by various interests and demands, and it is very unlikely that net economic benefit will be maximized.

The methodology proposed is to model the returns to the reform aspects of the Project by comparing the returns to the GOL's standard approach to maintenance (e.g., on a sporadic and/or emergency basis) to those anticipated from the data-driven approach being introduced under the Compact. The main outcome will be measured from HDM-4 and expressed in decreased vehicle operating costs and reduced travel time. As mentioned above, the evaluation will focus on the costs and benefits associated with the Roads Sector Reform Activity. The outcomes of the program logic and the indicators for addressing Evaluation Question 1 are presented in the table below.

**Table VI-i Outcomes and outcome indicators to answer Evaluation Question 1**

Outcomes	Indicator(s)
Outcome (C): Decreased travel time	Indicator C1
Outcome (D): Decreased vehicle operating costs	Indicator D1

The CBA of the Roads Sector Reform Activity will model the costs and the benefits associated with the two scenarios of “base case scenario” and “reform case scenario”. The base case scenario will be the continuation of maintenance resource allocation on an ad-hoc basis based on the discretion of decision makers and public demands as discussed above. Meanwhile, the reform case scenario will be the allocation of maintenance funds done based on a data-driven maintenance plan. The costs and benefits associated with these two scenarios are given in the table below:

**Table VI-ii Costs and Benefits for Base Case and Reform Case Scenarios**

Item description	Base case scenario	Reform case scenario
<b>Costs</b>		
Staff requirements at the MPW	No separate RMMU; No or limited data collection conducted by the planning or operations department staff. Therefore, staff costs are considered negligible.	Separate RMMU with sufficient staff for data collection, data management, data analysis and maintenance plan preparation. Annual staff cost of RMMU will be considered.
Data collection	Limited visual inspection by the operations division staff and no additional cost considered.	Annual data collection cost as per the data collection plan for RMMU required for the preparation of maintenance plans.
Training and capacity building cost	Negligible.	The cost of MCC funded Road Sector Reform Activity and any other training and capacity building conducted for periodic maintenance planning.
<b>Benefits</b>		
Net benefits estimated to accrue to the society [Outcome (G) Increased spending for prioritized road maintenance; Indicator G1]	<p>Less than optimal net benefits accrual to the society is expected as maintenance fund allocation from a limited budget may not be allocated based on a detailed analysis.</p> <p>The net benefits estimated for a random selection of projects to be funded in each year from the list of projects for periodic maintenance</p>	<p>Net benefits accrual to the society will be maximized with maintenance fund allocation as per the maintenance plan prepared based on a detailed analysis using HDM-4.</p> <p>The net benefits estimated for the prioritized selection of projects to be funded as per the maintenance plan in each year from the list of projects for periodic maintenance.</p>

## 6.1.2 Detailed Secondary Data Collection Methodology

### 6.1.2.1 Baseline Data Collection

**Description of Methodology:** As part of the reform activity, HDM-4 model calibration has been completed and the RMMU has used the calibrated model for the maintenance plan preparation. Secondary data on the maintenance planning system established within the MPW and the HDM model used and the maintenance plans prepared will be obtained from the MPW RRMU.

**Data Processing/Data Analysis:** The secondary data collection will be used to inform the scenario analysis with and without a maintenance planning system established within the MPW.

### 6.1.2.2 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

### **6.1.3 Detailed Primary Data Collection Methodology - KIIs**

#### **6.1.3.1 Baseline Data Collection**

Baseline KII will not be conducted. Only secondary sources will be reviewed, and these sources will be requested from relevant stakeholders during KIIs conducted for Evaluation Question 2.

#### **6.1.3.2 Endline Data Collection**

**Description of Methodology:** The team will meet with key stakeholders and conduct interviews to collect information on current road maintenance practices to understand the base case scenario and the reform scenario.

**Sample Units:** N/A

**Target Respondents:** MPW, RMMU, IIU, RFA staff

**Sample Size and Assumptions:** 10 KIIs.

**Sample Frame:** Officials from the MPW, RMMU, IIU, and RFA associated with the training and preparation of maintenance plans.

**Sampling Strategy:** Informants will be selected based on their role in the Project, trainings that they received, and the extent to which they understand the maintenance cost data.

**Instruments/Equipment:** Semi-structured interviews based on an Excel-template with questions.

**Rounds and Timing:** To select the timeline of the endline, the evaluation will use a data-driven decision point to assess the timing. The team will monitor the budget approval process in July 2021 to observe whether the budget allocation is done as per the prioritized maintenance plan that used HDM. If the budget allocation is done as per the prioritized maintenance plan, endline data collection will be conducted in July/August 2022. If the answer is “no”, the evaluation team will monitor the progress made from July 2021 to July 2022. The progress will be assessed in July 2022 as follows:

- If the budget allocation during the budget approval process in July 2022 is done as per the prioritized maintenance plan that used HDM, the endline data collection will be conducted in July/August 2023.
- If the budget allocation is not done based on the prioritized maintenance plan, the endline data collection will take place in August/September 2022. The team believes that if the maintenance implementation plan is not implemented by 2022 it is unlikely to be successful in subsequent years.

**Location:** Monrovia and selected counties in Liberia.

**Staffing:** The KIIs will be conducted by the evaluation team and no additional staffing is anticipated for this evaluation area. The Team Leader/Road Maintenance Expert and/or the HDM-4 Expert will lead the data collection procedure to conduct KIIs with key stakeholders in Liberia, supported by the In-Country Coordinator.

**Safety Procedures/Precautions:** N/A

**Data Quality:** While the Team Leader/Road Maintenance Expert and/or the HDM-4 Expert leads the KIIs and takes notes, the In-Country Coordinator will assist by taking notes that will be used to cross-reference with the notes taken by the Team Leader/Road Maintenance Expert and/or the HDM-4 Expert. The In-Country Coordinator will transcribe the audio recording into English and the transcripts will be corrected by the Team Leader/Road Maintenance Expert and/or the HDM-4 Expert.

**Data Processing:** All KIIs will be audio recorded on digital voice recorders and transcribed by the In-Country Coordinator and reviewed by the Team Leader/Road Maintenance Expert and/or the HDM-4 Expert.

**Data Analysis:** The KII transcripts will be coded by the Junior Analyst with guidance from the Team Leader/Road Maintenance Expert and/or the HDM-4 Expert. Responses will be coded using the MS Excel template with KII questions in a consistent manner to answer the questions.

**Table VI-iii Primary Data Collection Summary Table for Evaluation Question 1**

Data collection	Timing	Sample Unit/ Respondent	Sample Size	Relevant Instruments	Exposure Period
KIIs	July/August 2023 or August/September 2022 (endline)	MPW, RMMU, IIU, RFA staff	10	Semi-structured interviews	13 months to 25 months

#### 6.1.4 Analysis Plan

The base case scenarios and reform case scenarios of road maintenance plan allocations will be modelled from the information gathered. The calibrated HDM-4 model will be used to analyze the scenarios and to generate agency and road user cost streams for each scenario. In addition, maintenance investment cost differentials between various scenarios will be generated based on unit maintenance costs. Net benefit streams will be generated from the cost streams of base scenarios and reform case scenarios will be used in estimating the rate of return of the Roads Sector Reform Activity

## VII. EVALUATION DESIGN – EVALUATION AREA 2: MAINTENANCE

### 7.1 EVALUATION QUESTION 2A METHODOLOGY

*Evaluation Question 2A: What are the relevant road authority's maintenance practices? How have these changed since the beginning of the Compact?*

#### 7.1.1 Methodology

Evaluation Question 2A will examine road authority's overall maintenance practices and how they changed since the beginning of the Compact. Details on changes that took place, if any, on maintenance planning and execution will be addressed under Evaluation Question 2B. The evaluation question has seven outcomes. The evaluation team will determine the answers to the evaluation question 2A through secondary sources (see Section 7.1.2) to the extent possible, complemented by KIIs. The achievement of the Project's outcomes as set out in the revised Theory of Change (see Section 4.1, Figure II.2) and in the revised Results Framework (Table IV-ii) will be measured.

The revised Results Framework presents the link between the Evaluation Questions and the Project's outcomes and outcome indicators, critical assumptions and beyond-the project horizon outcomes and indicators. To assess the change, the methodology employed for all research questions under research area 2 is pre-post. The change in the baseline and endline indicator values will be measured by the evaluation team to evaluate the achievement of the related outcome. Each outcome has an outcome indicator with a baseline value and an endline target value. As Compact activities are already underway, a true baseline cannot be established. However, because the staff members receiving technical assistance know the situation prior to the Compact, establishing a retrospective baseline is possible. Establishing a retrospective baseline during Compact implementation (rather than waiting until the end of the Compact), reduces the recall period and minimizes biased responses.

Most of the indicators in the Results Framework can be measured by reviewing secondary sources. Mostly the outcome indicators measuring the strengthening of capacities will require KIIs with trained GOL staff in addition to the review of the secondary sources. The trained GOL staff are staff from the MPW, at national and county levels, the NRF, the MoT, and LISGIS. When reviewing the secondary sources, the team will develop a detailed set of questions for the KIIs and key persons to interview within the Project's stakeholder organizations. The evaluation team will conduct KIIs to triangulate the information available from secondary sources and to obtain additional information not available from secondary sources.

**Table VII-i Outcomes and outcome indicators to answer Evaluation Question 2A**

Outcomes	Indicator(s)
Outcome (g): Strengthened capacities of GOL staff in planning of road network maintenance and improvement decisions	Indicator 11
Outcome (h): Road maintenance programming – with prioritized maintenance projects – prepared by MPW	Indicators 12, 13
Outcome (i): Maintenance projects prioritized under the MPW’s road maintenance plans approved by NRF	Indicator 14
Outcome (j): Strengthened capacities of GOL to consistently collect standardized data on (i)-(iii)*	Indicator 15
Outcome (k): Consistent collection of standardized data by GOL on (i)-(iii)*	Indicator 16
Outcome (l): Strengthened capacities of GOL to add collected data on (i)-(iii)* to the RAMS	Indicator 17
Outcome (m): Routinely addition of collected data on (i)-(iii)* to RAMS by GOL	Indicator 18

## 7.1.2 Detailed Secondary Data Collection Methodology

### 7.1.2.1 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will measure the achievement of the outcomes defined in the Results Framework against the baseline. Secondary data will be collected to address Evaluation Question 2A. The achievement of the seven outcomes in the Project objective statement (Table VII-i) will be assessed measuring the changes between baseline values for the outcome indicators in the Results Framework during the baseline period and the endline target values for 2022 or 2023, which will be measured after the Compact and interpreting the changes that occurred.

The team will review the following data sources for the indicators as available:

- One-Year Road Maintenance Program and the approval decision by the IMSC
- Annual Road Maintenance Expenditure Program and the approval decision by IMSC
- Five-Year NMRMP and the approval decision by the IMSC
- Annual Reports of MPW
- Annual Reports of the Office of the NRF
- Annual Budget Execution Reports of MoFDP
- Data from MPW Construction Bureau/ Highway and Maintenance
- Annual Implementation Progress Report on PAPD, Pillar 2.2

**Data Processing/Analysis:** Based on the analysis of the secondary data collected and the qualitative data collected, the team will determine what are the relevant road authority's maintenance practices and how these have changed since the beginning of the Compact.

### 7.1.2.2 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

## 7.1.3 Detailed Primary Data Collection Methodology – KIIs

### 7.1.3.1 Baseline Endline Data Collection

**Description of Methodology:** KIIs using semi-structured questionnaires are needed to complement secondary data collection. While KIIs will not be used to directly measure an indicator, if secondary data cannot sufficiently answer the achievement of the Project's objective with its seven outcomes, KIIs will be used **to substantiate and triangulate the information**, therefore KIIs are considered an appropriate source to confirm the validity of the secondary data, to point to additional secondary sources, and to provide more insight.

**Sample Units:** N/A

**Target Respondents:** Key stakeholders of the Roads Project.

**Sample Size and Assumptions:** 30

**Sample Frame:** Staff of MPW (IIU, RMMU, other departments, national and county levels), Office of the NRF, and other Project stakeholders, including maintenance contractors and donors active in the roads sector.

**Sampling Strategy:** Informants will be selected based on their role in the Project and their involvement in the roads sector in Liberia.

**Instruments/Equipment:** Semi-structured interviews will be developed containing two modules. The same KIIs will be used to answer EQ 2A, 2B, and 2C, therefore two modules will be developed. Module 1 will be specifically tailored for interviews with MPW, as these interviews will need to include OCAT elements to measure the increase in organizational capacity. Module 2 will include questions for all other stakeholders. The KII questions will seek to substantiate information on the indicators, confirm the validity of the secondary data, point to additional secondary sources, and to provide more insight.

**Rounds and Timing:** The KIIs will be conducted to establish the baseline values in September - October 2020.

**Location:** Monrovia and selected counties.

**Staffing:** The KIIs will be conducted by the Team Leader and the Evaluation/Organizational Change Expert. The In-Country Coordinator will support the evaluation team. Additional support staff may be required if the team splits and has interviews in different locations at the same time.

**Safety Procedures/Precautions:** N/A

**Data Quality/Processing/Analysis:** The evaluation team will ensure high quality data collection, processing, and analysis. Based on the mainly qualitative analysis and the comparison of primary with secondary data collected, the team will determine the relevant maintenance practices and how these have changed since the beginning of the Compact.

#### **7.1.3.2 Endline Data Collection**

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** The KIIs will be conducted to establish the endline target values in 2022 or in 2023.

**Table VII-ii Primary Data Collection Summary Table for Evaluation Question 2A**

Data collection	Timing	Sample Unit/ Respondent	Sample Size	Relevant Instruments	Exposure Period
KIIs (retroactive)	Sept - Oct 2020 (baseline)	Staff of MPW (IIU, RMMU, other departments, national and county levels), Office of the NRF, MoT, MoFDP and other Project stakeholders	30	Semi-structured interviews	N/A
KIIs	July/August 2023 or August/September 2022 (endline)	Staff of MPW (IIU, RMMU, other departments, national and county levels), Office of the NRF, MoT, MoFDP and other Project stakeholders	30	Semi-structured interviews	37 months to 49 months

## 7.2 EVALUATION QUESTION 2B METHODOLOGY

*Evaluation Question 2B: How were routine, periodic and emergency maintenance works planned and executed by the Government before the Compact and how are they planned and executed after the Compact? Did planning and execution of routine, periodic and emergency road maintenance improve? [Objective Question (Main Evaluation Question)]*

### 7.2.1 Methodology

Evaluation Question 2B is the main evaluation question under Evaluation Area 2 that will examine the changes in Liberia’s routine, periodic, and emergency maintenance works before and after the Compact. Seven sub-questions are designed to examine the nuances of the changes in the maintenance works, if any, and assess the sustainability of the changes.

Evaluation Question 2B has one main question (2B) and seven sub-questions (2B\_1 to 2B\_7). The evaluation team will determine the answers through secondary sources (see Section 7.2.2) to the extent possible, complemented by KIIs. The achievement of the Project’s outcomes as set out in the revised Theory of Change (see Section 4.2, Figure II.2) and in the revised Results Framework (Table IV-ii) will be measured. To assess the change, the methodology employed for all research questions under research area 2 is pre-post. The change in the baseline and endline indicator values will be measured by the evaluation team to evaluate the achievement of the related outcome. Each outcome has an outcome indicator with a baseline value and an endline target value. As Compact activities are already underway, a true baseline cannot be established. However, because the staff members receiving technical assistance know the situation prior to the Compact, establishing a retrospective baseline is possible. Establishing a retrospective baseline during Compact implementation (rather than waiting until the end of the Compact), reduces the recall period and minimizes biased responses.

Most of the indicators in the Results Framework can be measured by reviewing secondary sources. Mostly the outcome indicators measuring the strengthening of capacities will require KIIs with trained GOL staff in addition to the review of the secondary sources. These are staff from the MPW, at national and county levels, the NRF and MoT and LISGIS. When reviewing the secondary sources, the team will develop a detailed set of questions for the KIIs and key persons to interview within the Project’s stakeholder organizations. The main Evaluation Question 2B measures the achievement of the Project’s objective “To improve the planning and execution of routine, periodic and emergency road maintenance” and its six outcomes. The sub-questions

measure excerpts from various outcomes from the Theory of Change and related critical assumptions. The evaluation team will conduct KIIs to triangulate the information available from secondary sources and to obtain additional information not available from the secondary sources.

The tables below present the outcomes and outcome indicators for each sub-evaluation question.

***EQ 2B: How were routine, periodic and emergency maintenance works planned and executed by the Government before the Compact and how are they planned and executed after the Compact? Did planning and execution of routine, periodic and emergency road maintenance improve? [Objective Question (Main Evaluation Question)]***

**Table VII-iii Outcomes and outcome indicators to answer Evaluation Question 2B**

Outcomes	Indicator(s)
Outcome (d): Improved planning of routine road maintenance	Indicator 09
Outcome (e): Improved planning of periodic road maintenance	Indicator 09
Outcome (f): Improved planning of emergency road maintenance	Indicator 10
Outcome (a): Improved execution of routine road maintenance	Indicators 01, 04
Outcome (b): Improved execution of periodic road maintenance	Indicators 01, 06
Outcome (c): Improved execution of emergency road maintenance	Indicators 01, 07

***EQ 2B\_1. Did the improved planning and execution of road maintenance result in maintenance cost savings?***

**Table VII-iv Outcomes and outcome indicators to answer Evaluation Question 2B\_1**

Outcomes	Indicator
Outcome (F) GOL increases maintenance spending	Indicator F1
Outcome (G) Increased spending for prioritized road maintenance	Indicator G1

***EQ 2B\_2. How does the execution of road maintenance compare to the GOL's maintenance plans?***

**Table VII-v Outcomes and outcome indicators to answer Evaluation Question 2B\_2**

Outcomes	Indicator
Outcome (d): Improved planning of routine road maintenance	Indicator 09
Outcome (e): Improved planning of periodic road maintenance	Indicator 09
Outcome (f): Improved planning of emergency road maintenance	Indicator 10
Outcome (a): Improved execution of routine road maintenance	Indicators 01, 04
Outcome (b): Improved execution of periodic road maintenance	Indicators 01, 06
Outcome (c): Improved execution of emergency road maintenance	Indicators 01, 07

***EQ 2B\_3. If maintenance is carried out using the improved planning methods implemented by MCC using HDM-4 and cost savings result, are cost savings returned to the Government of Liberia, or are the added available funds used to carry out further maintenance?***

**Table VII-vi Outcomes and outcome indicators to answer Evaluation Question 2B\_3**

Outcomes	Indicator
Outcome (F) GOL increases maintenance spending	Indicator F1
Outcome (G) Increased spending for prioritized road maintenance	Indicator G1

***EQ 2B\_4. What is the role of the private sector in the new maintenance regime and how does this compare to the role envisioned for it under the Project?***

**Table VII-vii Outcomes and outcome indicators to answer Evaluation Question 2B\_4**

Critical Assumptions	Indicator
Critical Assumption 6: Performance-based periodic road maintenance contracts implemented as scheduled	CA6

**EQ 2B\_5.** *The established procedure put in place by the program includes, (1) Data collection, (2) Data analysis, (3) Planning, (4) NRF Approval of planned prioritized MPW works, (5) Allocation of funding by NRF, (6) Timely award of road maintenance contracts, and (7) Execution. The success of this program going forward depends on continuing this process. How likely is it that the Government will perpetuate this cycle post-compact? What, if anything, could MCC have done differently to ensure this cycle would last longer?*

**Table VII-viii Outcomes and outcome indicators to answer Evaluation Question 2B\_5**

Outcomes	Indicator
Outcome (g): Strengthened capacities of GOL staff in planning of road network maintenance and improvement decisions	Indicator 11
Outcome (d): Improved planning of routine road maintenance	Indicator 09
Outcome (e): Improved planning of periodic road maintenance	Indicators 09
Outcome (f): Improved planning of emergency road maintenance	Indicator 10
Outcome (a): Improved execution of routine road maintenance	Indicators 01, 04
Outcome (b): Improved execution of periodic road maintenance	Indicators 01, 06
Outcome (c): Improved execution of emergency road maintenance	Indicators 01, 07

**EQ 2B\_6.** *How sustainable is the new maintenance regime? Volpe’s assistance is currently slated to end at the end of July. After that, Volpe will only be assisting with RAMS, but will not be helping MPW with HDM-4, data collection, etc. Sustainability activities could continue Volpe’s assistance for one more cycle. Can GOL continue to use the system on their own? Why? If not, what could MCC have done differently to ensure the GOL would continue to use the system on their own?*

**Table VII-ix Outcomes and outcome indicators to answer Evaluation Question 2B\_6**

Outcomes	Indicator
Outcome (i): Maintenance projects prioritized under the MPW’s road maintenance plans approved by NRF	Indicator 14
Outcome (k): Consistent collection of standardized data by GOL on (i)-(iii)*	Indicator 16
Outcome (m): Routinely addition of collected data on (i)-(iii)* to RAMS by GOL	Indicator 18
Critical Assumption 4: Sufficient funding allocated by GOL to data collection	CA4
Critical Assumption 7: Sufficient funding allocated to road maintenance	CA7

\*=Standardized data on (i)-(iii)\*: (i) traffic on primary and secondary roads by dry and wet season, (ii) road and bridge and culvert inventory on primary network, and (iii) condition assessment on primary roads (not bridges)

**EQ 2B\_7.** *Does the overall quality of the road network improve, as a result of MCC’s investments in maintenance planning and execution?*

**Table VII-x Outcomes and outcome indicators to answer Evaluation Question 2B\_7**

Outcomes	Indicator
Outcome (E): Improved quality of road network	Indicator E1

## 7.2.2 Detailed Secondary Data Collection Methodology

*EQ 2B. How were routine, periodic and emergency maintenance works planned and executed by the Government before the Compact and how are they planned and executed after the Compact? Did planning and execution of routine, periodic and emergency road maintenance improve?*

### 7.2.2.1 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will measure the achievement of the outcomes defined in the Results Framework against the baseline. Secondary data will be collected to address Evaluation Question 2B, focusing on the change in how planning and execution of the maintenance practices is carried out as a result of the Project. The achievement of the six outcomes in the Project objective statement will be assessed measuring the changes between baseline values for the outcome indicators in the Results Framework during the baseline period and the endline target values for 2022 or 2023. These changes will be measured and interpreted after Compact completion.

The team will review the following data sources for the indicators as available:

- One-Year Road Maintenance Program and the approval decision by the IMSC
- Annual Road Maintenance Expenditure Program and the approval decision by IMSC
- Five-Year NMRMP and the approval decision by the IMSC
- Annual Reports of MPW
- Annual Reports of the Office of the NRF
- Annual Budget Execution Reports of MoFDP
- Data from MPW Construction Bureau/ Highway and Maintenance
- Annual Implementation Progress Report on PAPD, Pillar 2.2

Upon collecting secondary sources, the team will review and assess the Government's road maintenance policies, budget, and expenditure in further detail, comparing to see if there were any changes before and after the Compact.

**Data Processing/Analysis:** Based on the secondary data collected and the qualitative data collected, the team will determine how MCC's Project improved the planning and execution of maintenance.

### 7.2.2.2 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

*EQ 2B\_1. Did the improved planning and execution of road maintenance result in maintenance cost savings?*

### 7.2.2.3 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. "Maintenance cost savings" are not considered by the evaluation team as a relevant outcome when looking at cost-effective road maintenance. It is proposed to measure Outcomes F and G.

The team will review the following data sources for the indicator as available:

- 2016 NRF Act
- Annual Reports of the NRF
- Annual Budget Execution Report of MoFDP

**Data Processing/Analysis:** Based on the secondary data, the team will review whether the funds allocated through the NRF to road maintenance are actually used for road maintenance; and whether more than 60% of the NRF funds are used for road maintenance as required in the NRF Act. The year 2018 will be considered as the baseline as this is the first year NRF was functional. The changes comparing the baseline value for the outcome indicator and the endline target value for 2022 or 2023 after Compact completion will be assessed and interpreted.

#### 7.2.2.4 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

***EQ 2B\_2. How does the execution of road maintenance compare to the GOL's maintenance plans?***

#### 7.2.2.5 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. Secondary data will be collected to address Evaluation Question 2B\_2, by comparing the improved planning of routine, periodic and emergency road maintenance (outcomes (a)-(c)) against the improved execution of the maintenance practices, and to see to which extent plans were implemented and prioritized maintenance projects were funded and implemented. Baseline values of indicators will be compared against the endline target values in 2022/2023 after Compact completion. The changes occurred will be interpreted. The team will review the data sources listed under EQ 2B.

**Data Processing/Analysis:** Based on the secondary data collected and the qualitative data collected, the team will determine how the execution of road maintenance compares to the Government's maintenance plans.

#### 7.2.2.6 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

***EQ 2B\_3. If maintenance is carried out using the improved methods implemented by MCC using HDM-4 and cost savings result, are cost savings returned to the Government of Liberia, or are the added available funds used to carry out further maintenance?***

#### 7.2.2.7 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. Instead of looking at whether cost savings are used for added maintenance, the outcome evaluated should rather be Outcomes F and G (see also comment on EQ 2B\_1). The team will review the data sources listed above under EQ 2B\_1.

**Data Processing/Analysis:** Based on the secondary data, the team will review whether the funds allocated in the NRF to road maintenance are actually used for road maintenance; and whether more than 60% of the NRF funds are used for road maintenance as required in the NRF Act. The year 2018 will be considered as the baseline as this is the first year NRF was functional. The changes comparing the baseline value for the outcome indicator and the endline target value for 2022 or 2023 after Compact completion will be assessed and interpreted.

#### 7.2.2.8 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

*EQ 2B\_4. What is the role of the private sector in the new maintenance regime and how does this compare to the role envisioned for it under the Project?*

#### 7.2.2.9 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. Secondary resources on private sector's role in the new maintenance regime will include documents detailing progress of the World Bank projects on the OPRC contracts. Critical Assumption (CA) 6 will be evaluated to assess the performance-based periodic maintenance contract implementation.

The team will review the following data sources for the indicator as available:

- OPRC contracts
- Annual payment to private sector entities involved in the OPRC contracts

**Data Processing/Analysis:** Based on the secondary data, the team will review whether the OPRC contracts and the private sector's involved in road maintenance is taking place according to schedule. The changes comparing the baseline value for CA6 and the endline value for 2022/2023 after Compact completion will be assessed and interpreted.

#### 7.2.2.10 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

*EQ 2B\_5. The established procedure put in place by the program includes, (1) Data collection, (2) Data analysis, (3) Planning, (4) NRF Approval of planned prioritized MPW works, (5) Allocation of funding by NRF, (6) Timely award of road maintenance contracts, and (7) Execution. The success of this program going forward depends on continuing this process. How likely is it that the Government will perpetuate this cycle post-compact? What, if anything, could MCC have done differently to ensure this cycle would last longer?*

#### 7.2.2.11 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. Secondary data will be collected to address EQ 2B\_5, by analyzing to which extent strengthened capacities of GOL staff in planning of road network maintenance and improvement decisions have led to an improved planning of routine, periodic and emergency road maintenance (outcomes (a)-(c)) and to which extent this has led to an improved execution of the maintenance practices. This will be done by comparing baseline values of indicators against the endline target values in

2022/2023 after the Compact completion and assessing if there is evidence that supports the Theory of Change as outlined in Figure II.2: Revised Theory of Change of the Roads Project.

The team will review the following data sources for the indicators as available:

- Pre-and post-training course assessments of participants, training reports, course outlines, participant lists, training handouts
- One-Year Road Maintenance Program and the approval decision by the IMSC
- Annual Road Maintenance Expenditure Program and the approval decision by IMSC
- Five-Year NMRMP and the approval decision by the IMSC
- Annual Reports of MPW
- Annual Reports of the Office of the NRF
- Annual Budget Execution Reports of MoFDP
- Data from MPW Construction Bureau/ Highway and Maintenance
- Annual Implementation Progress Report on PAPD, Pillar 2.2

**Data Processing/Analysis:** Based on the secondary data collected and the qualitative data collected, the team will determine if the capacities of the MPW IIU, including the RMMU staff, and GOL road managers/ planners/ surveyors which are not part of the IIU, are sufficiently strengthened to the extent that they can perpetuate this cycle and to which extent they can continue to perform an improved planning and execution of road maintenance.

#### 7.2.2.12 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

*EQ 2B\_6. How sustainable is the new maintenance regime? Volpe's assistance is currently slated to end at the end of July 2019. After that, Volpe will only be assisting with RAMS, but will not be helping MPW with HDM-4, data collection, etc. Sustainability activities could continue Volpe's assistance for one more cycle. Can GOL continue to use the system on their own? Why? If not, what could MCC have done differently to ensure the GOL would continue to use the system on their own?*

#### 7.2.2.13 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. Secondary data will be collected to address EQ 2B\_6 by analyzing to which extent improved capacity of the GOL staff in planning of road network maintenance and improvement decisions, and data collection is sustainable. This will be done by comparing baseline values of indicators against the endline target values in 2022/2023 after the Compact closes and assessing if there is evidence that supports the Theory of Change as outlined in Figure II.2: Revised Theory of Change of the Roads Project.

The team will review the following data sources for the indicators as available:

- 5-Year NMRMP as submitted by MPW to the Office of NRF

- One-Year Road Maintenance Program as submitted by MPW to the Office of NRF
- Annual Road Maintenance Expenditure Program of NRF prepared by the Office of NRF as submitted to IMSC
- Annual Report of the NRF
- Data collection report(s), databases with datasets
- RAMS with consolidated, updated datasets

**Data Processing/Analysis:** Based on the secondary data collected and the qualitative data collected, the team will determine if the capacities of the MPW IIU, including the RMMU staff, and GOL road managers/planners/surveyors which are not part of the IIU, are sufficiently strengthened to the extent that they can perpetuate this cycle and to which extent they can continue to perform an improved planning and execution of road maintenance.

#### 7.2.2.14 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

**EQ 2B\_7. Does the overall quality of the road network improve, as a result of MCC's investments in maintenance planning and execution?**

#### 7.2.2.15 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. Secondary data sources will be used to answer this EQ. According to the Liberia PAPD, page 58, "Liberia has approximately 11,536 km of primary, secondary, urban and feeder roads. These comprise about 1,899, 2,479 and 6,263 km of unpaved primary, secondary and feeder roads respectively. Approximately 622 km of the total are paved roads." The data source is not mentioned in the PAPD. There was a 2016 World Bank Nationwide Road Inventory Survey published in 2018 which can be used as the baseline value for the indicator. The outcome is beyond the project's horizon and is measured by the indicator "Share of road network in excellent, good or fair, poor and very poor condition of total classified paved roads".

The team will review the following data sources for the indicator as available:

- 2016 World Bank Nationwide Road Inventory Survey published in 2018
- 2018 Nationwide Road Inventory Survey, to be published in 2019 (Interim report expected by end of August 2019)
- Most recent Nationwide Road Inventory Survey that is available in 2022 at the time of the endline data collection period

**Data Processing/ Analysis:** Based on the secondary data, the team will review whether there are changes comparing the baseline value for the outcome indicator and the endline target value for 2022/2023 after the Compact ends. Qualitative data collected will be used to assess the extent to which key informants consider that the Project contributed to an improved quality of the road network.

#### 7.2.2.16 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

### **7.2.3 Detailed Primary Data Collection Methodology – KIIs**

*EQ 2B. How were routine, periodic and emergency maintenance works planned and executed by the Government before the Compact and how are they planned and executed after the Compact? Did planning and execution of routine, periodic and emergency road maintenance improve?*

#### **7.2.3.1 Baseline Data Collection**

**Description of Methodology:** KIIs using semi-structured questionnaires are needed to complement secondary data collection. While KIIs will not be used to directly measure an indicator, if secondary data cannot sufficiently answer the achievement of the Project’s objective with its six outcomes, KIIs will be used **not** to assess the achievements of the objective level indicator, **but** to substantiate and triangulate the information, therefore they are considered as an appropriate source to confirm the validity of the secondary data, to point to additional secondary sources, and to provide more insight.

**Data Quality/Processing/Analysis:** Based on the analysis the team will determine how the planning and execution of maintenance works changed compared to before the Compact.

All other sections will be the same as described above under Section 7.1.3.1.

#### **7.2.3.2 Endline Data Collection**

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.1.3.2.

*EQ 2B\_1. Did the improved planning and execution of road maintenance result in maintenance cost savings?*

#### **7.2.3.3 Baseline Data Collection**

**Description of Methodology:** "Maintenance cost savings" are not considered by the evaluation team as a relevant outcome when looking at cost-effective road maintenance. Each year, a fixed budget is made available for maintenance purposes. In the past and in the foreseeable future, these budgets were and will be well below the optimal budget. These budgets will be completely used for maintenance activities. Improved planning will mean that those funds will be spent on high priority maintenance activities, i.e. those activities that produce the most benefits. Improved execution means that these funds are used as efficiently as possible in order to achieve as much benefits as possible. So instead of cost savings, the result is an increase in benefits for a given budget.

**Data Quality/Processing/Analysis:** Based on the analysis the team will determine whether NRF sources are increasingly used for road maintenance.

All other sections will be the same as described above under Section 7.1.3.1.

#### **7.2.3.4 Endline Data Collection**

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.1.3.2.

***EQ 2B\_2. How does the execution of road maintenance compare to the GOL's maintenance plans?***

#### 7.2.3.5 Baseline Data Collection

**Description of Methodology:** The baseline primary data collection will use KIIs as the same methodology. To the extent that secondary data cannot sufficiently answer the achievement of the outcomes specified to answer this evaluation question, KIIs will be used to substantiate and triangulate the information.

**Data Quality/Processing/Analysis:** Based on the analysis the team will determine how the execution of road maintenance compares to the Government's maintenance plans.

All other sections will be the same as described above under Section 7.1.3.1.

#### 7.2.3.6 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.1.3.2.

***EQ 2B\_3. If maintenance is carried out using the improved planning methods implemented by MCC using HDM-4 and cost savings result, are cost savings returned to the Government of Liberia, or are the added available funds used to carry out further maintenance?***

#### 7.2.3.7 Baseline Data Collection

**Description of Methodology:** The baseline primary data collection will use KIIs as the methodology. Instead of looking at whether cost savings are used for added maintenance, the proposed evaluated outcome is whether the GOL increases its maintenance spending and whether there is an increased spending for prioritized road maintenance (see Outcomes F, G, indicators F1, G1). To the extent that secondary data cannot sufficiently answer the achievement of the outcomes specified to answer this evaluation question, KIIs will be used to substantiate and triangulate the information.

**Data Quality/Processing/Analysis:** Based on the analysis, the team will determine whether the NRF sources are increasingly used for road maintenance.

All other sections will be the same as described above under Section 7.1.3.1.

#### 7.2.3.8 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.1.3.2.

***EQ 2B\_4. What is the role of the private sector in the new maintenance regime and how does this compare to the role envisioned for it under the Project?***

#### 7.2.3.9 Baseline Data Collection

**Description of Methodology:** The World Bank and the EU fund performance based routine maintenance contracts that include periodic maintenance. The World Bank started implementing the OPRC regime, and the EU is also involved. For the roads under the OPRC, the contractors will be required to maintain the road after construction/rehabilitation for the following ten years. MCC is not using this approach since the Matching Road Maintenance Fund (if it was not withheld) would only be used for periodic road maintenance. The periodic maintenance contracts would be tendered out each year and roads under the OPRC contracts (with a periodic maintenance component on primary roads) are excluded from the road network eligible for periodic maintenance under the MCC Compact. The future of private sector's involvement is still unclear: the GOL may generalize the OPRC approach to all roads, abandon it, or continue using both systems in parallel.

EQ 2B\_4 is not linked to an outcome in the revised Results Framework and thus does not have a relevant outcome indicator. Rather, EQ 2B\_4 is related to a critical assumption for the project as indicated in the Results Framework and the Theory of Change. The baseline primary data collection will use KIIs. To the extent that secondary data cannot sufficiently answer the changes in CA6, KIIs will be used to substantiate and triangulate the information.

**Data Quality/Processing/Analysis:** Based on the analysis, the team will describe the role of the private sector as it was before the Compact, the intended role as described in the Compact, and the actual role of the private sector as finally established after the compact.

All other sections will be the same as described above under Section 7.1.3.1.

#### 7.2.3.10 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.1.3.2.

*EQ 2B\_5. The established procedure put in place by the program includes, (1) Data collection, (2) Data analysis, (3) Planning, (4) NRF Approval of planned prioritized MPW works, (5) Allocation of funding by NRF, (6) Timely award of road maintenance contracts, and (7) Execution. The success of this program going forward depends on continuing this process. How likely is it that the Government will perpetuate this cycle post-compact? What, if anything, could MCC have done differently to ensure this cycle would last longer?*

**Description of Methodology:** KIIs will be used as the baseline and endline primary data collection methodology. The retrospective baseline is required to see if procedures put in place by the program were actually only put in place by the program or already applied prior to the program. To the extent that secondary data cannot sufficiently answer the achievement of the outcomes specified for this evaluation question, KIIs will be used to substantiate and triangulate the information.

**Data Quality/Processing/Analysis:** Based on the analysis, the team will determine how the strengthened capacities of GOL staff in planning of road network maintenance and improvement decisions have led to an improved planning of routine, periodic and emergency maintenance (outcomes (a)-(c)) and to which extent this has led to an improved execution of the maintenance practices. The team will also provide an answer to the final questions included in EQ 2B\_5: (i) *How likely is it that the Government will perpetuate this cycle post-compact? and (ii) What, if anything, could MCC have done differently to ensure this cycle would last longer?*

All other sections will be the same as described above under Section 7.1.3.1.

#### 7.2.3.11 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.1.3.2.

*EQ 2B\_6. How sustainable is the new maintenance regime? Volpe's assistance is currently slated to end at the end of July. After that, Volpe will only be assisting with RAMS, but won't be helping MPW with HDM-4, data collection, etc. Sustainability activities could continue Volpe's assistance for one more cycle. Can GOL continue to use the system on their own? Why? If not, what could MCC have done differently to ensure the GOL would continue to use the system on their own?*

#### 7.2.3.12 Baseline Data Collection

**Description of Methodology:** The baseline primary data collection will use KIIs as the methodology. The sub-question's definition of sustainability can be broadly defined. In addition to looking at critical assumptions that are important to sustained improvements in road maintenance practices, the outcomes related to consistent application of the technical assistance received (indicator 14, 16, 18) will be reviewed. To the extent that secondary data cannot sufficiently answer the achievement of the outcomes specified to answer this evaluation question, KIIs will be used to substantiate and triangulate the information. Information gathered to answer EQ 2B\_6 will be complemented by the analysis under EQ 2C.

**Data Quality/Processing/Analysis:** Based on the analysis, the team will determine the sustainability of the new maintenance regime. The team will determine the factors that led to GOL's continued or discontinued use of the new maintenance regime. In addition, the KIIs will examine any pitfalls that were not fully addressed by MCC to improve the sustainability of the assistance provided.

All other sections will be the same as described above under Section 7.1.3.1.

#### 7.2.3.13 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.1.3.2.

*EQ 2B\_7. Does the overall quality of the road network improve, as a result of MCC's investments in maintenance planning and execution?*

#### 7.2.3.14 Baseline Data Collection

**Description of Methodology:** The baseline and endline primary data collection will use KIIs as the methodology. To the extent that secondary data cannot sufficiently answer the achievement of the outcomes specified to answer this evaluation question, KIIs will be used to substantiate and triangulate the information.

**Data Quality/Processing/Analysis:** Based on the analysis, the team will determine how the overall quality of the road network has improved. The attribution to MCC's investments in maintenance planning and execution will be challenging, because MCC's contribution to the

Matching Road Maintenance Fund has been withheld and the outcome “Improved quality of road network” is a beyond-the project horizon outcome which goes beyond the Project’s objective statement “To improve the planning and execution of routine, periodic and emergency road maintenance”. Also, since several donors are active in the maintenance sector in a coordinated way, and with complementary activities, deciding how much of the changes can be attributed to the MCC investments, will be difficult.

All other sections will be the same as described above under Section 7.1.3.1.

### 7.2.3.15 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.1.3.2.

**Table VII-xi Primary Data Collection Summary Table for Evaluation Question 2B**

Data collection	Timing	Sample Unit/ Respondent	Sample Size	Relevant Instruments	Exposure Period
KIIs (retroactive)	Sep - Oct 2020 (baseline)	Staff of MPW (IIU, RMMU, other departments, national and county levels), Office of the NRF, MoT, MoFDP and other Project stakeholders	30	Semi-structured interviews	N/A
KIIs	July/August 2023 or August/September 2022 (endline)	Staff of MPW (IIU, RMMU, other departments, national and county levels), Office of the NRF, MoT, MoFDP and other Project stakeholders	30	Semi-structured interviews	37 months to 49 months

## 7.3 EVALUATION METHODOLOGY – EVALUATION QUESTION 2C

**Evaluation Question 2C: What organizational, political, and economic factors are shaping road maintenance decisions and practices in Liberia?**

### 7.3.1 Methodology

This evaluation question is meant to evaluate MCC’s assumptions about the sustainability of its sector reform interventions, based on an organizational change and political economy analysis (PEA). To address EQ 2C, the analysis will utilize USAID’s Organizational Capacity Assessment Tool (OCAT)<sup>30</sup> to assess the change in organizational capacity.

Evaluation Question 2C has one main question (2C) and seven sub-questions (2C\_1 to 2C\_7). The evaluation team will determine the answers through secondary sources (see Section 7.3.2) to the extent possible, complemented by KIIs. The evaluation team will use USAID’s OCAT and measure the achievement of the Project’s outcomes through indicators as set out in the revised Theory of Change (see Section 4.2, Figure II.2: Revised Theory of Change of the Roads Project) and in the revised Results Framework (Table IV-ii). To assess the change, the methodology employed for all research questions under research area 2 is pre-post. The change in the baseline and endline indicator values will be measured by the evaluation team to evaluate the achievement

<sup>30</sup> USAID (2014), Organizational Capacity Assessment Tool.

of the related outcome. Each outcome has an outcome indicator with a baseline value and an endline target value. As Compact activities are already underway, a true baseline cannot be established. However, because the staff members receiving technical assistance know the situation prior to the Compact, establishing a retrospective baseline is possible. Establishing a retrospective baseline during Compact implementation (rather than waiting until the end of the Compact), reduces the recall period and minimizes biased responses.

The OCAT has seven sections according to which KIIs will be organized. The questions 2C, 2C\_1 to 2C\_7 will be incorporated into these KIIs. The OCAT sections are: 1) governance and legal structure, 2) financial management and internal control system, 3) administrative and procurement systems, 4) human resource systems, 5) program management, 6) project performance management, and 7) organizational management and sustainability. For each of the seven sections, the team will assess the MPW's capacity of using the steps outlined in the capacity building tool at the baseline and the endline. Each area will be given a score of 1 (low capacity) to 4 (strong capacity) as per the OCAT methodology. If the political economy is found to play a significant role in the Roads Projects' ability to achieve its results, the evaluation team will consider conducting a full PEA analysis using the recent Applied PEA Field Guide by USAID<sup>31</sup> methodology, which is in line with the approaches used by Britain, the Netherlands, and Sweden<sup>32</sup>.

The tables below present the outcomes and outcome indicators for each sub-evaluation question.

***EQ 2C\_1. How is Road Maintenance Regulated?***

**Table VII-xii Outcomes and outcome indicators to answer Evaluation Question 2C\_1**

Outcomes	Indicator
Outcome (h): Road maintenance programming – with prioritized maintenance projects – prepared by MPW	Indicators 12, 13
Outcome (i): Maintenance projects prioritized under the MPW's road maintenance plans approved by NRF	Indicator 14

***EQ 2C\_2. How and to what extent did the Compact help to clarify and strengthen governance and regulatory arrangements for road maintenance?***

**Table VII-xiii Outcomes and outcome indicators to answer Evaluation Question 2C\_2**

Outcomes	Indicator
Outcome (h): Road maintenance programming – with prioritized maintenance projects – prepared by MPW	Indicators 12, 13
Outcome (i): Maintenance projects prioritized under the MPW's road maintenance plans approved by NRF	Indicator 14
Outcome (k): Consistent collection of standardized data by GOL on (i)-(iii)*	Indicator 16
Outcome (m): Routinely addition of collected data on (i)-(iii)* to RAMS by GOL	Indicator 18

\*=Standardized data on (i)-(iii)\*: (i) traffic on primary and secondary roads by dry and wet season, (ii) road and bridge and culvert inventory on primary network, and (iii) condition assessment on primary roads (not bridges)

***EQ 2C\_3. How is road maintenance funded and how does this compare to funding needs and projections?***

<sup>31</sup> USAID (2016), Draft Working Document: USAID Applied Political Economy Analysis Field Guide.

<sup>32</sup> These are the Drivers of Change, Power Analysis, and Strategic Governance and Corruption Analysis, respectively.

**Table VII-xiv Outcomes and outcome indicators to answer Evaluation Question 2C\_3**

Outcomes	Indicator
Critical Assumption 7: Sufficient funding allocated to road maintenance: Share of optimal financial road maintenance needs in 5-Year NMRMP for maintenance works that were met with budget disbursed	CA7
Critical Assumption 8: Good coordination of GOL with donors in Roads sector	CA8
Outcome (a): Improved execution of routine road maintenance	Indicators 01, 04
Outcome (b): Improved execution of periodic road maintenance	Indicators 01, 06

**EQ 2C\_4. How did this change from before the MCC intervention to after?**

**Table VII-xv Outcomes and outcome indicators to answer Evaluation Question 2C\_4**

Outcomes	Indicator
Outcome (g): Strengthened capacities of GOL staff in planning of road network maintenance and improvement decisions	Indicator 11
Outcome (j): Strengthened capacities of GOL to consistently collect standardized data on (i)-(iii)*	Indicator 15
Outcome (k): Consistent collection of standardized data by GOL on (i)-(iii)*	Indicator 16
Outcome (l): Strengthened capacities of GOL to add collected data on (i)-(iii)* to the RAMS	Indicator 17
Outcome (m): Routinely addition of collected data on (i)-(iii)* to RAMS by GOL	Indicator 18

\*—Standardized data on (i)-(iii)\*: (i) traffic on primary and secondary roads by dry and wet season, (ii) road and bridge and culvert inventory on primary network, and (iii) condition assessment on primary roads (not bridges)

**EQ 2C\_5. What evidence is there that MCC facilitated those changes (if relevant)?**

**Table VII-xvi Outcomes and outcome indicators to answer Evaluation Question 2C\_5**

Outcomes	Indicator
Critical Assumption 5: Training and other capacity strengthening efforts resulted in willingness of GOL staff to apply the know-how in planning and execution of road maintenance projects	CA5

**EQ 2C\_6. Are there factors influencing road transport agencies' policies and practices that could have been addressed by MCC to improve investment outcomes? What are these factors, and how should they be assessed during project design?**

**Table VII-xvii Outcomes and outcome indicators to answer Evaluation Question 2C\_6**

Outcomes	Indicator
Outcome (A) Changed annual average daily traffic	Indicators B1
Outcome (E) Improved quality of road network	Indicator F1

**EQ 2C\_7. Are the funds in the Road Fund being used to maintain the road network?**

**Table VII-xviii Outcomes and outcome indicators to answer Evaluation Question 2C\_7**

Outcomes	Indicator
Outcome (F) GOL increases maintenance spending	Indicator F1
Outcome (G) Increased spending for prioritized road maintenance	Indicator G1

### 7.3.2 Detailed Secondary Data Collection Methodology

**EQ 2C. What organizational, political, and economic factors are shaping road maintenance decisions and practices in Liberia?**

#### 7.3.2.1 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. The secondary data collection and analysis will help to inform the KIIs. This evaluation question is meant to evaluate MCC's assumptions about the sustainability of its road sector reform interventions, based on an organizational change and PEA. To address EQ 2C, the analysis will utilize USAID's OCAT<sup>33</sup> to assess the change in organizational capacity.

The team will review the following secondary data sources for the OCAT sections 1-7:

- 1. Governance and legal structure:** Law establishing MPW and by-laws; relevant major laws and regulations (tax, labor, occupational health and safety, and environment); MPW organigram; Job descriptions of senior managers;
- 2. Financial management and internal control system:** MPW's financial policies and procedures manual; Annual and multi-year budgets, financial monitoring tools, revenue and expenditure reports, accounting journals, chart of accounts, general ledger, revenue and expenditure reports; Financial reports to government, MCC and other donors; filing system; payment vouchers; petty cash records; Audit policy, financial audit reports, post-audit management plans;
- 3. Administrative and procurement systems:** MPW's policy and procedures manual; Procurement policies, plans, and files; payment vouchers; Fixed assets register, physical inventory reports; Branding and marking plan;
- 4. Human resource systems:** MPW's human resources manual, recruitment guidelines or policy, recruitment procedures, retention strategy or policy; Payroll policies and procedures, time sheets, work schedule policies, payment vouchers, timesheets; Staff and consultant resumes and salary histories, consultant work products; Organization chart, supervision plan, supervisor reports, training needs assessment and training plans for supervisors, employee and contractor work plans;
- 5. Program management:** MPW's policy and procedure manuals; donor policies; grant and contract agreements; donor reports, audits, and evaluations; Progress and technical reports, donor feedback on reports; Project guidelines; stakeholder analyses; project plans; site visit, monitoring, and evaluation reports; Culture assessments; gender analyses; strategy documents; project plans;
- 6. Project performance management:** MPW's monitoring plans, tools, and internal reports, technical reports for donors, project mitigation plans; Project and program evaluation plans, evaluation tools, evaluation reports; International, national, or sectoral standards for service delivery, assessments by standard-setting entities; Policy and procedures manuals, records of communications with field staff, field visit reports;
- 7. Organizational management and sustainability:** Strategic plans; annual reports; project workplans, reviews of workplan progress; Policies, processes, and plans for change management; schedule for reviewing policies; Reports and presentations on lessons learned; documentation on participation in public and private sector and donor dialogues; Resource mobilization plan; fundraising history; partnership agreements.

**Data Processing/Analysis:** Secondary data will be processed prior to inform the OCAT KII analysis. Based on the analysis, the team will determine how the planning and execution of

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<sup>33</sup> USAID (2014), Organizational Capacity Assessment Tool.

maintenance works changed compared to before the Compact. The data will be processed under the following aspects following the OCAT sections:

- 1. Governance and legal structure:** Review of MPW's vision and mission statements, legal registration and compliance, organizational structure, board composition and responsibility;
- 2. Financial management and internal control system:** Review of the financial management systems, financial controls, financial documentation, financial statements and financial reporting, audit experience, and cost sharing capacity;
- 3. Administrative and procurement systems:** Review of MPW's operational policies, procedures, and systems, including those for travel, procurement, fixed asset control, and branding and marking as well as management;
- 4. Human resource systems:** Assessment of the quality of staff job descriptions, recruitment, and retention approaches, staffing levels, personnel policies, the staff time management and payroll system, staff and consultant history documentation, the staff salary and benefits policy, staff performance management;
- 5. Program management:** Assessment of MPW's experience with donor compliance, sub-award management, technical reporting, stakeholder involvement, and addressing culture and gender issues;
- 6. Project performance management:** Assessment of MPW's ability to monitor and evaluate projects, implement high-quality programs that meet recognized standards, supervise staff, and provide field support and oversight;
- 7. Organizational management and sustainability:** Assessment the MPW's ability to do effective strategic planning, use annual workplans, manage change; generate and share knowledge and develop linkages, achieve financial sustainability; and foster effective internal communications and decision making.

#### **7.3.2.2 Endline Data Collection**

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

#### ***EQ 2C\_1. How is Road Maintenance Regulated?***

#### **7.3.2.3 Baseline Data Collection**

**Description of Methodology:** Baseline secondary data collection will use the same methodology. In addition to the secondary information for the OCAT, secondary data will be used to evaluate the achievement towards the outcomes below using the indicators specified in the Results Framework.

The team will review the following data sources for the indicator as available:

- 5-Year NMRMP as submitted by MPW to the Office of NRF
- One-Year Road Maintenance Program as submitted by MPW to the Office of NRF
- Annual Road Maintenance Expenditure Program of NRF prepared by the Office of NRF as submitted to IMSC

- Annual Report of the NRF

**Data Processing/Analysis:** The baseline value and endline value for the indicators targets for 2022/2023 will be compared after the Compact completion. However, the results will be analyzed only if the maintenance projects actually approved by NRF are those prioritized by MPW using HDM-4 for periodic maintenance planning and ROMAPS for routine maintenance planning.

#### 7.3.2.4 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

*EQ 2C\_2. How and to what extent did the Compact help to clarify and strengthen governance and regulatory arrangements for road maintenance?*

#### 7.3.2.5 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. In addition to the secondary information for the OCAT, secondary data will be used to evaluate the achievement towards the outcomes below using the indicators specified in the Results Framework.

The team will review the following data sources for the indicator as available:

- 5-Year NMRMP as submitted by MPW to the Office of NRF
- One-Year Road Maintenance Program as submitted by MPW to the Office of NRF
- Annual Road Maintenance Expenditure Program of NRF prepared by the Office of NRF as submitted to IMSC
- Annual Report of the NRF
- Data collection report(s), databases with datasets
- RAMS with consolidated, updated datasets

**Data Processing/Analysis:** Comparing the baseline value and endline value for the indicators for 2022/2023 after the Compact completion will be evaluated if MPW continues the regular collection of data and adds them continuously to the RAMS and uses these data for its road maintenance planning, uses HDM-4 for periodic maintenance planning and ROMAPS for routine maintenance planning, and if these prioritized projects are actually those which NRF approves. The Compact has trained MPW (and NRF) in this systematic approach. The achievement of the outcomes will show if they continue to apply this new governance and regulatory regime.

#### 7.3.2.6 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

*EQ 2C\_3 How is road maintenance funded and how does this compare to funding needs and projections?*

#### 7.3.2.7 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. In addition to the secondary information for the OCAT, secondary data will be used to evaluate

the achievement towards the outcomes below with the indicators specified in the Results Framework.

The team will review the following data sources for the indicator as available:

- 5-Year National Medium-Term Road Maintenance Plan (NMRMP 2019-2023) of MPW
- Annual Budget Execution Reports of MoFDP since 2019
- Agenda, Invitation, Participants list, (minutes of meetings, if available) of donor coordination meetings
- Annual Implementation Progress Report on PAPD since 2019
- Annual Reports of MPW and NRF
- Annual Road Maintenance Expenditure Program of NRF
- FMIS of MoFDP
- Annual Budget Execution Report of MoFDP
- One-Year Road Maintenance Program of MPW
- Data from MPW/ Construction Bureau/ Highway and Maintenance

**Data Processing/Analysis:** Comparing the baseline value and endline value for the indicators for 2022/2023 after the Compact completion will be evaluated to understand the extent the financial needs for an optimal road maintenance are met and how.

#### **7.3.2.8 Endline Data Collection**

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

#### ***EQ 2C\_4. How did this change from before the MCC intervention to after?***

#### **7.3.2.9 Baseline Data Collection**

**Description of Methodology:** Baseline secondary data collection will use the same methodology. In addition to the secondary information for the OCAT, secondary data will be used to evaluate the achievement towards the outcomes below with the indicators specified in the Results Framework.

The team will review the following data sources for the indicator as available:

- Pre-and post- course assessments of participants, training reports, participant lists, training handouts, course outlines, certificate recipients from Volpe and BAH
- 5-Year NMRMP, One-Year Road Maintenance Program
- Annual Road Maintenance Expenditure Program of NRF prepared by the Office of NRF as submitted to IMSC
- Data collection report(s), databases with datasets
- 5-Year NMRMP, One-Year Road Maintenance Program, Annual Expenditure Road Maintenance Program

- RAMS with consolidated, updated datasets

**Data Processing/Analysis:** Comparing the baseline value and endline value for the indicators for 2022/2023 after Compact completion; it will evaluate to which extent the capacities of GOL staff were strengthened by the Project and to which extent this has led to a consistent data collection added onto the RAMS and continuously used for a scientifically-based prioritization in the planning of maintenance projects.

#### 7.3.2.10 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

*EQ 2C\_5. What evidence is there that MCC facilitated those changes (if relevant)?*

#### 7.3.2.11 Baseline Data Collection

**Description of Methodology:** Secondary data collection is not required to address EQ 2C\_5. KIIs will be used as part of the OCAT.

**Data Processing/Analysis:** N/A

#### 7.3.2.12 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

*EQ 2C\_6. Are there factors influencing road transport agencies' policies and practices that could have been addressed by MCC to improve investment outcomes? What are these factors, and how should they be assessed during project design?*

#### 7.3.2.13 Baseline Data Collection

**Description of Methodology:** Secondary data collection is not required to address EQ 2C\_6. KIIs will be used as part of the OCAT.

**Data Processing/Analysis:** N/A

#### 7.3.2.14 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

*EQ 2C\_7. Are the funds in the National Road Fund being used to maintain the road network?*

#### 7.3.2.15 Baseline Data Collection

**Description of Methodology:** Baseline secondary data collection will use the same methodology. Secondary data will be used to evaluate the achievement towards the outcomes below with the indicators specified in the Results Framework.

The team will review the following data sources for the indicator as available:

- 2016 NRF Act
- Annual Reports of the NRF
- Annual Budget Execution Report of MoFDP

**Data Processing/Analysis:** Based on the secondary data, the team will review whether the funds allocated through the NRF to road maintenance are actually used for road maintenance; whether more than 60% of the NRF funds are used for road maintenance as required in the NRF Act. The year 2018 will be considered as the baseline as this is the first year NRF was functional. The changes comparing the baseline value for the outcome indicator and the endline target value for 2022 or 2023 after Compact completion will be assessed and interpreted.

#### 7.3.2.16 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section.

### 7.3.3 Detailed Primary Data Collection Methodology – KIIs

*EQ 2C. What organizational, political, and economic factors are shaping road maintenance decisions and practices in Liberia?*

#### 7.3.3.1 Baseline Data Collection

**Description of Methodology:** The KIIs will build on an in-depth secondary data analysis in order to be well prepared for the interviews. This EQ is meant to evaluate MCC’s assumptions about the sustainability of its sector reform interventions, based on an organizational change and PEA. To address EQ 2C, the analysis will utilize USAID’s OCAT<sup>34</sup> to assess the change in organizational capacity.

**Sample Units:** N/A

**Target Respondents:** 30 staff from MPW, donors and clients/contracted road construction companies and consultants. For the OCAT sections 1-7, different target respondents will be interviewed:

- 1. Governance and legal structure:** Staff of MPW: Minister, deputy ministers, directors, senior managers, legal counsel, chief financial officer, and staff;
- 2. Financial management and internal control system:** Staff of MPW: Deputy minister for financial affairs, director, board chair or representative, chief financial officer, accountant, financial staff, and external auditor;
- 3. Administrative and procurement systems:** Staff of MPW: Deputy minister for administration and procurement, chief financial officer, accountant, financial staff, external auditor, and IT manager;
- 4. Human resource systems:** Staff of MPW: Deputy minister for human resources, director for human resources and staff;
- 5. Program management:** Staff of MPW: Minister, deputy ministers, directors, donor aid coordinator, program managers and staff; contractors; donors;
- 6. Project performance management:** Staff of MPW: Minister, deputy ministers, M&E directors; staff responsible for monitoring and evaluation; clients/ contracted road construction companies;

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<sup>34</sup> USAID (2014), Organizational Capacity Assessment Tool.

- 7. Organizational management and sustainability:** Staff of MPW: Minister, deputy ministers, directors, senior managers; managers and staff of program, fundraising, communications, and monitoring and evaluation units; consultants involved in organizational development strategic planning, fundraising, and change management.

**Sampling Strategy:** Informants for the KIIs will be selected based upon their senior role in MPW in accordance with target respondents outlined above. Informants at donors and clients/ contracted road construction companies will be selected according to their senior role in collaborating with MPW in road maintenance planning and execution.

**Instruments/Equipment:** Semi-structured interviews based on an Excel-template with questions using OCAT.

**Rounds and Timing:** The KIIs will be conducted to establish the baseline values in September - October 2020.

**Location:** Monrovia and selected counties.

**Staffing:** The KIIs will be conducted by the Team Leader and the Evaluation/Organizational Change Expert. The In-Country Coordinator will support the evaluation team. Additional support staff may be required if the team splits and has interviews in different locations at the same time.

**Safety Procedures/Precautions:** N/A

**Data Quality/Processing/Analysis:** The evaluation team will ensure high quality data collection, processing, and analysis. Based on the analysis the team will determine how the planning and execution of maintenance works changed compared to before the Compact. Responses will be coded using the MS Excel template with KII questions in a consistent manner to answer the questions. The primary data will be processed under the following aspects following the OCAT sections:

- 1. Governance and legal structure:** Review of MPW's vision and mission statements, legal registration and compliance, organizational structure, board composition and responsibility;
- 2. Financial management and internal control system:** Review of the financial management systems, financial controls, financial documentation, financial statements and financial reporting, audit experience, and cost sharing capacity;
- 3. Administrative and procurement systems:** Review of MPW's operational policies, procedures, and systems, including those for travel, procurement, fixed asset control, and branding and marking as well as management;
- 4. Human resource systems:** Assessment of the quality of staff job descriptions, recruitment, and retention approaches, staffing levels, personnel policies, the staff time management and payroll system, staff and consultant history documentation, the staff salary and benefits policy, staff performance management;
- 5. Program management:** Assessment of MPW's experience with donor compliance, sub-award management, technical reporting, stakeholder involvement, and addressing culture and gender issues;

6. **Project performance management:** Assessment of MPW’s ability to monitor and evaluate projects, implement high-quality programs that meet recognized standards, supervise staff, and provide field support and oversight;
7. **Organizational management and sustainability:** Assessment the MPW’s ability to do effective strategic planning, use annual workplans, manage change; generate and share knowledge and develop linkages, achieve financial sustainability; and foster effective internal communications and decision making.

#### 7.3.3.2 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** The KIIs will be conducted to establish the endline target values in 2022 or 2023.

#### *EQ 2C\_1. How is Road Maintenance Regulated?*

##### 7.3.3.3 Baseline Data Collection

**Description of Methodology:** The baseline primary data collection will use the same KII methodology. The OCAT methodology will be applied, and the achievement of the outcomes specified to answer this evaluation question will be answered through secondary data to the extent possible; KIIs will be used to substantiate and triangulate the information.

**Data Quality/Processing/Analysis:** Based on the analysis the team will determine if maintenance projects actually approved by NRF are those prioritized by MPW in its plans using HDM-4 for periodic maintenance planning and ROMAPS for the routine maintenance planning.

All other sections will be the same as described above under Section 7.3.3.1.

##### 7.3.3.4 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.3.3.2.

#### *EQ 2C\_2. How and to what extent did the Compact help to clarify and strengthen governance and regulatory arrangements for road maintenance?*

##### 7.3.3.5 Baseline Data Collection

**Description of Methodology:** The baseline primary data collection will use the same KII methodology. The OCAT methodology will be applied, and the achievement of the outcomes specified to answer this evaluation question will be answered through secondary data to the extent possible, KIIs will be used to substantiate and triangulate the information.

**Data Quality/Processing/Analysis:** Based on the analysis, the team will determine how the MPW continues the regular collection of data (in which they were trained by the Project) and adds them continuously to the RAMS, then using these data for its road maintenance planning [using HDM-4 for periodic maintenance planning (through MCC Compact) and ROMAPS for routine maintenance planning (through GIZ)]. The Project has trained MPW (and NRF) in this systematic

approach to prioritizing periodic road maintenance projects using HDM. The achievement of outcomes will show if they continue to apply this new governance and regulatory regime.

All other sections will be the same as described above under Section 7.3.3.1.

#### **7.3.3.6 Endline Data Collection**

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.3.3.2.

***EQ 2C\_3. How is road maintenance funded and how does this compare to funding needs and projections?***

#### **7.3.3.7 Baseline Data Collection**

**Description of Methodology:** The baseline primary data collection will use the same KII methodology. The OCAT methodology will be applied, and the achievement of the outcomes specified to answer this evaluation question will be answered through secondary data to the extent possible; KIIs will be used to substantiate and triangulate the information.

**Data Quality/Processing/Analysis:** Based on the analysis, the team will determine to which extent the financial needs for an optimal road maintenance are met and how.

#### **7.3.3.8 Endline Data Collection**

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.3.3.2.

***EQ 2C\_4. How did this change from before the MCC intervention to after?***

#### **7.3.3.9 Baseline Data Collection**

**Description of Methodology:** The baseline and endline primary data collection will use the same KII methodology. The OCAT methodology will be applied, and the achievement of the outcomes specified to answer this evaluation question will be answered through secondary data to the extent possible; KIIs will be used to substantiate and triangulate the information.

**Data Quality/Processing/Analysis:** Based on the analysis, the team will determine to which extent the capacities of GOL staff were strengthened by the Project and to which extent this has led to consistent data collection efforts that are then added onto the RAMS and continuously used for a scientifically-based prioritization in planning of road maintenance projects.

#### **7.3.3.10 Endline Data Collection**

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.3.3.2.

***EQ 2C\_5. What evidence is there that MCC facilitated those changes (if relevant)?***

#### **7.3.3.11 Baseline Data Collection**

**Description of Methodology:** The baseline and endline primary data collection will use KIIs as the same methodology. The OCAT methodology will be applied, and the achievement of the outcomes specified to answer this evaluation question will be answered through KIIs.

**Data Quality/Processing/Analysis:** Based on the analysis, the team will determine if there is evidence that the Project’s training and other capacity building efforts resulted in a willingness of GOL staff to apply the know-how in planning and execution of road maintenance projects.

#### 7.3.3.12 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.3.3.2.

*EQ 2C\_6. Are there factors influencing road transport agencies’ policies and practices that could have been addressed by MCC to improve investment outcomes? What are these factors, and how should they be assessed during project design?*

#### 7.3.3.13 Baseline Data Collection

**Description of Methodology:** The baseline and endline primary data collection will use the same KII methodology. The OCAT methodology will be applied.

**Data Quality/ Processing/ Analysis:** Based on the analysis, the team will determine which factors influence road transport agencies’ policies and practices and whether they could have been assessed during project design.

#### 7.3.3.14 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.3.3.2.

*EQ 2C\_7. Are the funds in the National Road Fund being used to maintain the road network?*

#### 7.3.3.15 Baseline Data Collection

**Description of Methodology:** The baseline and endline primary data collection will use the same KII methodology. The achievement of the outcome specified to answer this evaluation question will be answered through secondary data to the extent possible; KIIs will be used to substantiate and triangulate the information.

**Data Quality/ Processing/ Analysis:** Based on the analysis, the team will determine to which extent the funds in the NRF are used for road maintenance.

#### 7.3.3.16 Endline Data Collection

The methodology for the endline data collection will be the same as described above under the baseline data collection section other than the section below:

**Rounds and Timing:** see Section 7.3.3.2.

**Table VII-xix Primary Data Collection Summary Table for Evaluation Question 2C**

Data collection	Timing	Sample Unit/ Respondent	Sample Size	Relevant Instruments	Exposure Period
KIIs (retroactive)	Sep - Oct 2020 (baseline)	Staff of MPW (IIU, RMMU, other departments, national and county levels), Office of the NRF, MoT, MoFDP, other Project stakeholders, and donors	30	Semi-structured interviews	N/A
KIIs	July/August 2023 or August/September 2022 (endline)	Staff of MPW (IIU, RMMU, other departments, national and county levels), Office of the NRF, MoT, MoFDP, other Project stakeholders, and donors	30	Semi-structured interviews	37 months to 49 months

## VIII. EVALUATION DESIGN – EVALUATION AREA 3: ROAD USAGE PATTERN

**Evaluation Question 3: Have road usage patterns changed, in terms of who is traveling on the roads, why, what they are transporting, what they are paying for transport, and how long it takes to move along key routes? [optional]**

### 8.1 EVALUATION QUESTION 3 METHODOLOGY

#### 8.1.1 Methodology

To decide whether Evaluation Question 3 is going to be pursued, the evaluation team proposes to establish a decision point. If the indicators used to respond to evaluation question 2B\_7 (“Does the overall quality of the road network improve, as a result of MCC’s investments in maintenance planning and execution?”) show a strong improvement in the overall road network quality at endline, Evaluation Question 3 should also be studied. Only endline data will be collected to answer this evaluation question in late 2023 after the endline data for EQ2 has been collected and analyzed.

Information gleaned from answering the question will help confirm/validate the identity of the main beneficiaries of the maintenance projects (i.e. who is traveling on the road, what are they transporting). Second, the answer to the question on why people are traveling on the road (i.e. journey purpose) is an important input needed for the preparation of future maintenance plans based on the HDM-4 model. Third, the information on fares and travel time will help validate the HDM-4 estimates, and could potentially be used in conjunction with the HDM-4 estimates to identify profit/loss margins (which would be an indicator of market competitiveness) and assess whether different operators are charging the same fares for given routes.

To assess whether road usage patterns have been impacted by the periodic maintenance works, a post-test only assessment will be conducted. To do this, a number of roads will be selected for the assessment, specifically roads on which periodic maintenance works have been completed using the Matching Road Maintenance Fund or using the prioritized maintenance plan. The roads will be selected based on the maintenance plans prepared as part of the Roads Sector Reform Activity and in consultation with MCC and MPW.

The primary data that will be used in this assessment are O-D survey and public transport user survey data. A data collection firm will be engaged for conducting these surveys on the selected roads. Traffic count data, as secondary source, will inform EQ 3.

**Table VIII-i Outcomes and outcome indicators to answer Evaluation Question 3**

Outcomes	Indicator(s)
Outcome (A): Changed annual average daily traffic	Indicators A1
Outcome (C): Decreased travel time	Indicator C1
Outcome (D): Decreased vehicle operating costs	Indicator D1

#### 8.1.2 Detailed Secondary Data Collection Methodology

##### 8.1.2.1 Baseline Data Collection

Secondary sources will not be evaluated at baseline.

### 8.1.2.2 Endline Data Collection

**Description of Methodology:** The Roads Sector Reform Activity trained MPW staff on manual traffic counting and provided traffic counting equipment. Traffic count data from the selected roads will be obtained from the MPW.

**Data Processing/Data Analysis:** Average annual daily traffic (AADT) will be calculated based on the traffic count data.

## 8.1.3 Detailed Primary Data Collection Methodology – Origin-Destination Survey

### 8.1.3.1 Baseline Data Collection

The endline data collection will ask retroactive questions to the road users to obtain information about their road usage before the road maintenance work started and to establish a retrospective baseline.

### 8.1.3.2 Endline Data Collection

**Description of Methodology:** The O-D survey methodology will consist of intercepting vehicles at one or more locations on the subject road. Assisted by local police, vehicles will be intercepted at the survey stations and safely directed to the survey areas. An interviewer will conduct the survey in-person with vehicle occupants/drivers by soliciting responses verbally. A potential problem with this procedure is that occupants/drivers will be free to withhold information during the roadside interview. To mitigate this risk, the evaluation team will explain the purpose and use of the data and also assure that this data will not be used for any other purpose. The interviewers will be trained to ask questions in a way that occupants/drivers clearly understand the questions and not feel uncomfortable in answering the questions. The survey process will be monitored by the supervisors to ensure reliable data are obtained.

**Sample Unit:** The sampling unit of the O-D survey is motorized vehicle.

**Target Respondents:** Target respondents are vehicle drivers and occupants.

**Sample Size and Assumptions:** N/A (sampling rate)

**Sample Frame:** A sample rate of 20 percent (i.e. every fifth vehicle) is the target for the O-D survey by vehicle type.

**Sampling Strategy:** For each vehicle type, every fifth vehicle will be selected for an interview. A counter will track the number of vehicles by type to assist the selection process.

**Instrument/Equipment:** Interviews will be administered using computer-assisted personal interviewing (CAPI). Hand-held electronic devices, such as tablets or smartphones, will be programmed with a data collection software to record the interview data. Interviewers will administer a short questionnaire to the vehicle driver/occupants and record the information.

**Table VIII-ii Illustrative O-D Questions for Each Type of Drivers**

Type of questions asked	Type of Drivers		
	Private car owners	Freight/cargo transporter/ forwarders	Bus drivers
Trip origin	X	X	X
Final trip destination	X	X	X
Vehicle type/axle configuration	X	X	X

Type of questions asked	Type of Drivers		
	Private car owners	Freight/cargo transporter/ forwarders	Bus drivers
Seating capacity of vehicle	X		X
Maximum load (tons)		X	
Current load (tons)		X	
Type of goods carrying (according to classes)		X	
Estimated value of the goods carrying		X	
Average speed when traveling on road section	X	X	X
Estimated traveling time from origin to destination	X	X	X
Purpose of trip	X		
Distance of trip	X	X	X
Number of passengers (by gender)	X		X
Frequency of trips on the road per month/year	X	X	X

In addition to the above, O-D questionnaire will collect additional elements including fares for transporting goods and people and motivations for the trip. These questions will be particularly important in responding to Evaluation Areas 3 and 4, providing data to help with the analysis of change in road usage patterns and prices in the market for passenger transit and cargo.

**Rounds and Timing:** The O-D surveys will be conducted on selected recently maintained roads that have been prioritized for maintenance works based on the maintenance plan. Data collection will be conducted in late 2023 after the endline for evaluation question 2B\_7 is collected and analyzed. The exact timing will be discussed with MCC if the results of evaluation question 2B\_7 show strong improvements in the overall road quality. The survey period will be for two days, 24 hours covering representative days of the week (Sunday for weekend, and Monday for weekday) that do not fall during a public holiday period.

**Location:** The O-D survey will be conducted at one or more locations along the subject roads, preferably at or near a junction with a major road. The exact data collection locations will be determined in consultation with MPW and MCC based on the roads selected. Consideration will also be given to the availability of some basic facilities such as a café or small shop or filling station to ensure the safety and basic comfort of the surveyors while making sure there is sufficient space to safely stop vehicles in a cordoned off area of the road.

**Staffing:** The evaluation team will subcontract the O-D survey and the team sizes will be determined by the successful bidder, based on a competitive procurement process. O-D survey are usually performed by a team of between three and five persons for each direction of traffic. In addition, one supervisor is to oversee the O-D survey on each road.

**Safety Procedures/Precautions:** Since the survey will involve intercepting vehicles, safety procedures will be supervised by the local traffic police. All personnel will be required to wear high-visibility safety vests at all times. The evaluation team will develop traffic control plans to ensure personnel are safe at each survey station. The traffic plans will provide guidance on the position of the traffic delineators and the percentage of the road that needs to be cordoned off with traffic cones to allow for sufficient space to stop and park the vehicle while the surveyors are at work. The traffic plans will include sketches that provide a visual representation of the survey work area and the space to be reserved/ cordoned off. The police, supported by appropriate signage, is expected to assist in intercepting vehicles and directing the surveyed vehicle to the secured survey area. In addition, approximately two to three meters of space will be required inward from

the carriageway to position equipment (i.e. tables, chairs, umbrellas and/or tents) that will provide protection against the sun and rain and where surveyors can stow survey materials and/or rest during periods of inactivity. Good visibility of the roads in both directions, avoiding road bends/slopes, will also be ensured in positioning the survey locations. The O-D survey location in each direction will be staggered to avoid congestion.

**Data Quality:** Prior to data collection, the subcontractor and the evaluation team will train, pre-test, and pilot the survey to ensure high quality data collection. The role of the supervisor is vital in order to consistently check the work of the surveyors to ensure the survey is conducted properly. The supervisor will closely oversee the O-D survey to ensure that information is complete, and data are not missing. After data collection, the evaluation team will conduct random checks at a minimum of 10 percent of responses to ensure the data is recorded correctly and quickly rectify for any anomalies.

**Data Processing/Analysis:** Averages of passenger occupancy and trip purpose data will be calculated by vehicle type. Similarly, the number of hour and kilometers driven per year will be calculated by vehicle type.

#### **8.1.4 Detailed Primary Data Collection – Public Transport User Survey**

##### **8.1.4.1 Baseline Data Collection**

The endline data collection will ask retroactive questions to the public transport users to obtain information about fares, discounts, travel times, and preference for public transportations before the road maintenance work started and to establish a retrospective baseline.

##### **8.1.4.2 Endline Data Collection**

**Description of Methodology:** Public Transport User (PTU) survey will be conducted as an extension of the O-D survey to collect more detailed information regarding individual journeys including information on fares, discounts, travel times, and preference for public transportations. The PTU survey will be conducted as part of the O-D survey.

**Sample Units:** Individuals using public transportations.

**Target Respondents:** Target respondents are individuals using public transportation who are above 18.

**Sample Size and Assumptions:** N/A (sampling rate)

**Sampling Strategy:** During the O-D survey, the survey will intercept buses for interviews. While the drivers are being interviewed for the O-D survey, all passengers on the selected buses will be interviewed for the PTU survey.

**Instruments/Equipment:** Survey will be administered using CAPI.

**Rounds and Timing:** The surveys will be issued during the same days as the O-D surveys.

**Location:** Since the PTU survey will be an extension to the O-D survey, the location will be same as the O-D survey location.

**Staffing:** The teams conducting the O-D survey will conduct the PTU survey as an extension of the O-D survey. Therefore, no additional staff is needed.

**Data Processing/Analysis:** Averages of trip purpose data and origin-destination data will be calculated by the type of public transportation and gender.

All other sections will be the same as described above under Section 8.1.3.2.

**Table VIII-iii Primary Data Collection Summary Table for Evaluation Question 3**

<b>Data collection</b>	<b>Timing</b>	<b>Sample Unit/ Respondent</b>	<b>Sample Size</b>	<b>Relevant Instruments</b>	<b>Exposure Period</b>
O-D	TBD (endline)	Motorized vehicle drivers and occupants	Sampling Rate TBD	CAPI	TBD
PTU	TBD (endline)	Public transport users	Sampling Rate TBD	CAPI	TBD

## **IX. EVALUATION DESIGN – EVALUATION AREA 4: TRANSPORTATION MARKET STRUCTURE**

***Evaluation Question 4: Given the existing transportation market structure, what portion of VOC savings will be passed on to consumers of transportation services? If not all savings are passed on, could this project have cost effectively addressed these inefficiencies? How? How is the transportation market structured and what is the likelihood that VOC savings will be passed on to consumers of transportation services? Did this change from before the MCC intervention to after? What evidence is there that MCC facilitated those changes (if relevant)? [optional]***

### **9.1 EVALUATION QUESTION 4 METHODOLOGY**

#### **9.1.1 Methodology**

Similar to Evaluation Question 3, Evaluation Question 4 is going to be pursued if the indicators used to respond to evaluation question 2B\_7 (“Does the overall quality of the road network improve, as a result of MCC’s investments in maintenance planning and execution?”) show a strong improvement in the overall road network quality at endline. Only endline data will be collected to answer this evaluation question in late 2023 after the endline data for EQ 2 has been collected and analyzed.

To address EQ 4, the evaluation team will examine the transportation market structure to assess the distribution of VOC savings and whether they are passed on to consumers of transportation services. The key linkage between road investments and economic benefits is the reduction in VOCs and TT and how they influence the demand for transportation services. In addition to road usage pattern changes (Evaluation Area 3), changes in the demand for transportation services can also be seen through changes in the transportation market structure. For example, are public transport operators charging the same fares or cargo rates for given routes as before the maintenance works were completed? This would constitute a change in the transportation market.

#### **Structure of the Transportation Market**

For the purposes of this question, the markets for 1) passengers and 2) cargo on Liberia’s road network will be discussed. Given the country’s already high dependency on road transport, it is unlikely that a shift from other modes of transportation to road transport would be seen (if any) due to the improvement of the roads through maintenance works. What may be possible is that passenger fares and cargo costs can change due to VOC and TT changes that are experienced by the public transport vehicle operators.

The first part of the question asks about the transportation market. The transportation market for passengers consists of 1) private vehicles, 2) passenger buses, and 3) other vehicles, including motorcycle taxis and/or transport vehicles in the informal market (“unofficial” taxis). The O-D survey, public transport user survey, and KIIs will help us evaluate the structure of the passenger transportation market and the pricing of transporting passengers.

In the transportation market for cargo, trucks can be divided into categories which may include the following: freight forwarders in an association that are hired to carry freight, independent (owner-operated) truckers that are hired to carry freight and independent (owner-operated) truckers that carry their own freight. Companies may use freight forwarders to transport their freight or may

have their own truck or fleet of trucks. The O-D survey and KIIs from freight forwarding associations and with independent truckers will help us evaluate the structure of the cargo market, including the pricing of transporting cargo.

### **Likelihood that VOC savings will be passed on**

The second part of this evaluation questions asks about the likelihood that VOC savings will be passed on to consumers of transportation services. For road users that use their own vehicle, it is clear that they will benefit from the VOC savings. However, for users relying on transport operators, the savings in VOC can be either transmitted completely to the user in a highly competitive transport market or retained by cartels of transport operators or companies if transportation costs are set below market prices by the government.

Since the Compact’s overall goal is economic growth, it would be most useful if the reductions in VOC accrued completely to the road users. This would provide a maximum stimulation for them to increase production leading to economic growth (assuming they use the savings in travel costs for productive purposes). This evaluation question will examine to what degree transport costs were reduced for passenger traffic and transporters of cargo after the road maintenance works have been completed.

Through the O-D survey and interviews with key informants, the team also will evaluate the market of taxis and unofficial taxis (owner-operators who are not officially licensed by the government giving rides to passenger). Since the passenger buses offer an alternative that was not officially there, and the rate of private car ownership has gone up, the team expects that there will be lower numbers of passengers in this segment of the market.

### **Post-test only of MCC Intervention**

To assess whether the transportation market structure has been impacted by maintenance works, a post-test only assessment is proposed. To do this, a number of roads will be selected for the assessment, specifically roads on which periodic maintenance works have been completed with Matching Road Maintenance Fund based on the maintenance plans prepared as part of the Roads Sector Reform Activity. The selection of these roads will be done in consultation with MCC and MPW.

**Table IX-i Outcomes and outcome indicators to answer Evaluation Question 4**

Outcomes	Indicator(s)
Outcome (D): Decreased vehicle operating costs	Indicator D1

## **9.1.2 Detailed Secondary Data Collection Methodology**

### **9.1.2.1 Baseline Data Collection**

Secondary sources will not be evaluated at baseline.

### **9.1.2.2 Endline Data Collection**

**Description of Methodology:** The evaluation team will collect and review reports and documents of historical data on fares, where available, and also collect information on reported fares for passenger service if publicly available. The team will also collect freight prices from existing associations of drivers (if any) in the unit available, e.g. container, ton-kilogram, ton-kilogram-meter. Data which may exist and could be valuable includes association membership rosters and

licensee information, both of which could potentially help (1) estimate the number of operators servicing the selected roads or (2) identify subjects for key informant interviews.

**Data Processing/Data Analysis:** Data will be used to analyze to which the VOC savings have accrued to road users.

### **9.1.3 Detailed Primary Data Collection Methodology – KIIs**

#### **9.1.3.1 Baseline Data Collection**

The endline data collection will ask retroactive questions to establish the baseline.

#### **9.1.3.2 Endline Data Collection**

**Description of Methodology:** The evaluation team will analyze the transportation market structure and the formal and informal institutions that regulate and govern the transportation market. The evaluation team will explore the structure and competitiveness of the transportation sector to understand how likely it is that VOC savings have been passed on to consumers, such as public transport users, farmers transporting their agricultural products to market, or truck operators transporting their food/perishable goods/chemical fertilizers/consumer goods to Monrovia.

The evaluation team will collect information on reported fares for passenger service, such as fares set in the informal market from providers of transport in the informal market. The team will collect freight prices from existing associations of drivers (if any) and from independent owner-operated drivers.

The team will also examine the impacts of the transportation market structure on women, which in turn impacts the degree to which women are beneficiaries of the road. For example, the team will ask transport service drivers about industry norms/practices and setting of fares as a means of asking whether women receive any prejudicial or preferential treatment. This will complement the information gathered from the O-D surveys. If there are any transport service drivers or transport service non-driver owners that are women, the team will also seek to interview them.

**Sample Units:** N/A

**Target Respondents:** Key informants of the transport sector in Liberia.

**Sample Size and Assumptions:** 20

**Sample Frame:** Formal and informal passenger transporters including taxi and bus operators, formal and informal cargo transporters including freight forwarders, transportation regulator within the MPW.

**Sampling Strategy:** Informants will be selected based on their role in the Project and their involvement in the roads sector in Liberia.

**Instrument/Equipment:** Semi-structured interviews

**Rounds and Timing:** For Evaluation Area 4, data collection will occur in tandem with one of the O-D surveys and PTU surveys, to potentially leverage contacts with drivers, who may be willing to participate in the more in-depth interviews later.

**Location:** Monrovia and selected counties.

**Staffing:** The KIIs will be conducted by the evaluation team. The In-Country Coordinator will support the evaluation team. Additional support staff may be required if the team splits and has interviews in different locations at the same time.

**Safety Procedures/Precautions:** N/A

**Data Quality/Processing/Analysis:** Qualitative data analysis will be used to analyze the data collected from the interviews. The evaluation team will classify, sort, and arrange information gathered to identify trends and examine the relationships in the data. The team will cross-examine information when relevant to help build a body of evidence to support the analysis and decide on the extent to which the VOC savings have accrued to road users.

**9.1.4 Detailed Primary Data Collection Methodology – Origin-Destination Survey (see Section 8.1.3)**

**9.1.5 Detailed Primary Data Collection Methodology – Public Transport User Survey (see Section 8.1.4)**

The primary data that will be used in this assessment are O-D survey, PTU survey, and KII data.

**Table IX-ii Primary Data Collection Summary Table for Evaluation Question 4**

Data collection	Timing	Sample Unit/ Respondent	Sample Size	Relevant Instruments	Exposure Period
KIIs	TBD (endline)	Formal and informal passenger transporters and cargo transporters, regulators	20	Semi-structure interviews	TBD
O-D	TBD (endline)	Motorized vehicle drivers and occupants	Sampling Rate TBD	CAPI	TBD
PTU	TBD (endline)	Public transport users	Sampling Rate TBD	CAPI	TBD

## **X. ADMINISTRATIVE**

### **10.1 SUMMARY OF IRB REQUIREMENTS AND CLEARANCES**

The evaluation team will prepare and submit an Institutional Review Board (IRB) application to an IRB registered with the Office for Human Research Protections with the US Department of Health and Human Services for approval of the research and data collection plan. As of September 2019, there are two IRBs registered in Liberia, University of Liberia, and National Health Science Research Ethics Committee. IDG has experience working with the University of Liberia IRB and will the application to the University of Liberia IRB. The team anticipates only minimal psychosocial stress and related risks for the research participants.

The application materials for IRB will include four sets of documents: 1) a copy of the Design Report, 2) a copy of survey protocol, 3) copies of all data collection instruments that will be used for the survey, and 4) a completed IRB application form summarizing protection of participant's rights and data safety.

The selection of the participants to surveys on the road will respect the principle of equity since participants will be randomly selected among the road users on MCC-funded road segments. All survey and interview procedures will be based on the principles of voluntary participation and informed consent. Prior to participating in the survey, respondents will be given sufficient information on the objective of the survey and the use of the data collected to decide whether they wish to participate in the survey. The informed consent statement will closely follow the guidelines provided by MCC.

### **10.2 APPROVAL FROM LOCAL AUTHORITIES**

For the collection of field data, the evaluation team will contact the necessary authorities early and work closely to ensure their timely cooperation. The team, with assistance from data collection firms, will acquire official approval for data collection from the police and other relevant authorities.

### **10.3 DATA PROTECTION, ACCESS, AND DOCUMENTATION**

The study will ensure that the confidentiality of information obtained from or about human participants is maintained. The evaluation team will ensure that the raw datasets are cleaned and de-identified closely following MCC's guidelines for public use of data. The obtained data will be stored in a secured server with limited access to key project personnel who signed the non-disclosure agreement.

The evaluation team will provide both a raw, non-de-identified dataset and a clean, de-identified dataset to MCC for public and internal use. The public-use dataset will be free of personal or geographic identifiers that would permit identification of individual respondents. Any additional variables with risk of divulging identity of individual subjects will be removed. In order to facilitate access to and usability of data, all datasets delivered to MCC will be accompanied with completed documentation in the form of standardized metadata.

## 10.4 DISSEMINATION PLAN

The Baseline Report will be submitted to MCC, along with a briefing note and presentation materials, in 2021. The Endline Report will be submitted in late 2022/2023 (the exact timing is contingent on the timing of endline data collection). If EQ 3 and EQ 4 will be pursued, the Endline Report will be submitted in early 2024. The evaluation team will also submit the final datasets (a raw dataset and a de-identified dataset) and the analysis files. Feedback from MCC and local stakeholders will be incorporated to produce the final baseline and endline reports. Upon review by the Evaluation Management Committee (EMC), the evaluation team will present the results of the baseline and the endline in Liberia and Washington DC. The evaluation team will deliver the entire contents of the project library in good order properly indexed and marked in both digital and paper copy to MCC.

## 10.5 EVALUATION TEAM ROLES AND RESPONSIBILITIES

The evaluation team has three key personnel that work closely together for the evaluation and four technical support staff. The table below presents each evaluation team member and their responsibilities. The support team will provide technical and administrative capacity to carry out the project activities and achieve MCC’s goal and objectives. The diagram (Figure X.1) below shows the organizational chart of the complete evaluation team.

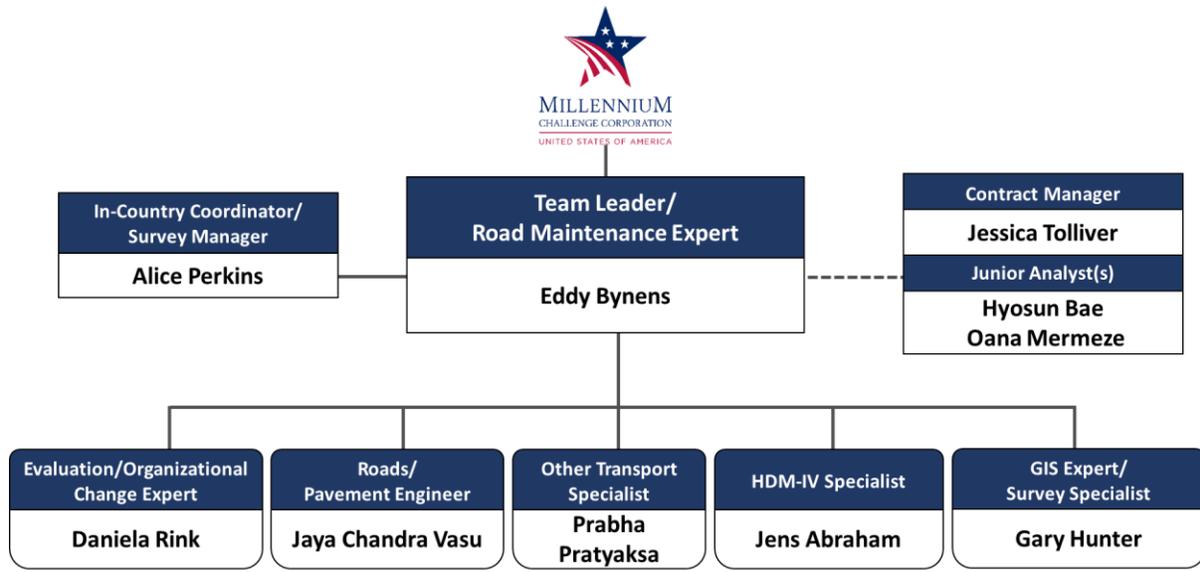
**Table X-i Evaluation Team and Responsibilities**

Name	Position	Responsibility
Eddy Bynens*	Team Leader/Road Maintenance Expert	<ul style="list-style-type: none"> <li>Evaluation Coordination and Quality Control</li> <li>Technical lead for the evaluation of Evaluation Area 2 on road maintenance</li> </ul>
Jens Abraham*	HDM-4 Specialist	<ul style="list-style-type: none"> <li>Technical lead for Evaluation Area 1: Engineering Analysis and Economic Model</li> <li>Technical lead for Optional Evaluation Area 3: Road Usage Patterns</li> <li>Technical lead for Optional Evaluation Area 4: Transportation Market Structure</li> </ul>
Daniela Rink*	Evaluation/Organizational Change Expert	<ul style="list-style-type: none"> <li>Technical support for the evaluation of Evaluation Area 2 on road maintenance</li> <li>Technical support for Evaluation Area 4: Transportation Market Structure</li> </ul>
Jaya Chandra Vasu	Roads/Pavement Engineer	<ul style="list-style-type: none"> <li>Technical support for Evaluation Area 1: Engineering Analysis and Economic Model</li> <li>Technical support for Evaluation Area 2: Maintenance, especially for assisting the analysis of road maintenance quality</li> </ul>
Prabha Pratyaksa	Other Transport Specialist	<ul style="list-style-type: none"> <li>Technical support for Evaluation Area 1: Engineering Analysis and Economic Model</li> <li>Technical support for Optional Evaluation Area 3: Road Usage Patterns</li> <li>Technical support for Optional Evaluation Area 4: Transportation Market Structure</li> </ul>
Alice Perkins	In-Country Coordinator/Survey Manager	<ul style="list-style-type: none"> <li>Logistical support for all Evaluation Areas</li> <li>Technical support for Optional Evaluation Area 3: Road Usage Patterns</li> </ul>

Name	Position	Responsibility
Gary Hunter	GIS Expert/ Survey Specialist	<ul style="list-style-type: none"> <li>• Technical support for Evaluation Area 1: Engineering Analysis and Economic Model</li> <li>• Technical support for Optional Evaluation Area 3: Road Usage Patterns</li> </ul>

\*Key personnel marked with \* are key personnel

**Figure X.1 Evaluation Team Organization Chart**



## XI. ANNEX I: EVALUABILITY ASSESSMENT SUMMARY

Table XI-i: Evaluability Assessment Tool

Project – Evaluability Assessment	
Assessment Categories	Strengths, Weaknesses, and Next Steps
<b>Dimension 1: Is the problem clearly defined and is there sufficient evidence to support the problem diagnostic?</b>	
Standards and best practices	
<ol style="list-style-type: none"> <li>1. Is there quantitative evidence regarding constraints to and sources of economic growth?</li> <li>2. Is the problem(s) clearly defined and understood with sufficient evidence/quantitative (baseline) data available to support claims?</li> <li>3. Is there evidence to support root causes identified?</li> <li>4. Will all root causes be addressed by the proposed intervention or other, complementary intervention(s)?</li> <li>5. Is there a public good rationale and/or market failure that necessitates government intervention and funding? This is linked to sustainability – how will recurrent costs be covered in the future, how will private sector investment be triggered, etc?</li> <li>6. Is the institutional context understood, the political economy understood, and does the team clearly understand how the proposed intervention(s) link to other initiatives by the gov't and/or other partners?</li> <li>7. Is there a clear understanding on how different social and cultural dynamics (gender, poverty, race, ethnicity, etc.) may be influenced by or influence the problem identified?</li> </ol>	<p>Strengths:</p> <ul style="list-style-type: none"> <li>• There is complementarity between the Energy Project and the Roads Project within the Compact because both are targeted at addressing two binding constraints to economic growth in Liberia: (i) lack of access to reliable and affordable electricity and (ii) inadequate road infrastructure. The analysis conducted using the growth diagnostic framework confirmed that the lack of reliable and affordable electricity and inadequate roads undermined private sector growth in the economy</li> <li>• Road maintenance is linked to the constraints of economic growth</li> <li>• Lack of quality data was accurately assessed as a major impediment to articulate road maintenance requirements and allocate scarce resources</li> </ul> <p>Weaknesses:</p> <ul style="list-style-type: none"> <li>• Articulation of the political economy and the institutional context for the Roads Project is vague. The Project Summary and the Compact Agreement, however, do show that MCC was aware of the activities of other donors in the sector and MCC support was meant to complement GIZ or USAID programming</li> </ul>

Project – Evaluability Assessment	
Assessment Categories	Strengths, Weaknesses, and Next Steps
	<ul style="list-style-type: none"> <li>Sustainability is contingent on the establishment of a well-functioning Road Fund. Ensuring the Road Fund is accurately funded past Compact implementation is uncertain</li> </ul>
<b>Dimension 2: Are the project objectives and theory of change/logic clearly defined?</b>	
Standards and best practices	
<ol style="list-style-type: none"> <li>Is the objective of the Project clearly stated with a link from the problem diagnostic?</li> <li>Is the project logic and economic model clear, plausible and based on existing evidence and literature? If there is limited evidence, is there commitment to generating evidence via an impact evaluation (linked to Section 5)?</li> <li>Is there a clear logic that links different projects within the Compact program that is then linked to accelerating economic growth?</li> <li>Is it clear which component(s) of the problem diagnostic will be addressed by the proposed intervention, which will be addressed by complementary activities and which will remain risks for the MCC intervention to achieve proposed results?</li> <li>Are the inputs, outputs, outcomes clearly defined and linked to the economic analysis (ERRs)?</li> <li>Is the timeline for expected results clear and based on evidence?</li> <li>Is it clear whether or not benefits are expected to be sustained beyond the life of the compact?</li> </ol>	<p><b>Strengths:</b></p> <ul style="list-style-type: none"> <li>The Roads Project responds to constraints to economic growth by aiming to strengthen road infrastructure by improving the planning for and the execution of routine, periodic and emergency road maintenance</li> </ul> <p><b>Weaknesses:</b></p> <ul style="list-style-type: none"> <li>The original Project objective was too broad, covering outcomes (improved planning and execution of routine and emergency maintenance works) which were not covered by the program logic of the Roads Project</li> <li>The original program logic does not show a theory of change of how the six outcomes in the Project objective statement would actually be achieved. Only improved planning and execution of periodic maintenance is covered by the originally designed activities</li> <li>Strengthened capacities resulting from technical assistance and trainings are not included in the Theory of Change</li> </ul>
<b>Dimension 3: Are the risks and assumptions clearly defined with potential risk mitigation strategies?</b>	
Standards and best practices	
<ol style="list-style-type: none"> <li>Are the risks to achieving expected results clear, with clearly defined risk mitigation strategies?</li> <li>Does the ERR reflect these assumptions and risks? Has sensitivity analysis been used to select key risks and assumptions?</li> <li>Is it clear how risks will be monitored?</li> </ol>	<p><b>Strengths:</b></p> <ul style="list-style-type: none"> <li>The design documents are critical of the potential risks associated with working in a low capacity, post-conflict country</li> </ul> <p><b>Weaknesses:</b></p>

<b>Project – Evaluability Assessment</b>	
<b>Assessment Categories</b>	<b>Strengths, Weaknesses, and Next Steps</b>
<p>4. Is it clear how design and implementation may be altered as information on new risks/realization of risks occurs?</p> <p>5. Does the project team make a critical assessment of the degree to which there may be blind spots or unknown unknowns in a project of this nature (e.g. how foreseeable are the potential risks that may arise in new sectors)?</p>	<ul style="list-style-type: none"> <li>• It is unclear how the identified risks were monitored</li> <li>• There has been no ERR or sensitivity analysis done for the baseline</li> </ul>
<b>Dimension 4: Are project participants clearly defined and justified in terms of geographic scope and eligibility criteria?</b>	
Standards and best practices	
<p>1. Is the selection criteria for project participants clearly defined and based on the problem and evidence in the program logic?</p> <p>2. Is program participants' selection based on credible, quantifiable selection criteria?</p> <p>3. Are specific demographics (age, gender, poverty status) defined where necessary?</p> <p>4. Are the geographic location(s) for the Project defined and based on the problem listed above and evidence in the program logic?</p> <p>5. Will the Project design and implementation plan vary by different sub-groups and/or geographic locations based on the problem listed above and evidence in the program logic?</p> <p>6. Can the selection be replicated for the purposes of an impact evaluation (linked with Section 5)?</p>	<p>Strengths:</p> <ul style="list-style-type: none"> <li>• Project participants such as MPW and MoT are clearly defined based on their role in improved planning and execution of road maintenance</li> <li>• The geographic locations for the Roads Project will be defined based on the application of HDM-4 analysis, a solid method to prioritize periodic road maintenance needs by ERR</li> </ul> <p>Weaknesses:</p> <ul style="list-style-type: none"> <li>• As the activities under the Roads Project were not sufficiently designed when the M&amp;E plan was developed, a beneficiary analysis could not be developed</li> </ul>
<b>Dimension 5: Are the metrics for measuring results for both accountability and learning clearly defined?</b>	
Standards and best practices	
<p><b><u>Are there clearly defined indicators and data sources identified for monitoring project implementation?</u></b></p> <p>1. Are there clearly defined indicators for measuring expected performance (processes, outputs)?</p> <p>2. Are the indicators linked to the ERR?</p>	<p>Strengths:</p> <ul style="list-style-type: none"> <li>• The original M&amp;E plan for the Roads Project had each program logic result covered by an indicator, including the process and output indicators</li> <li>• The M&amp;E plan estimated a Compact M&amp;E Budget of USD \$5.5 Million</li> </ul> <p>Weaknesses:</p>

Project – Evaluability Assessment	
Assessment Categories	Strengths, Weaknesses, and Next Steps
<p>3. Is it clear which indicators will be disaggregated by gender, age, income as appropriate?</p> <p>4. Is there a clear understanding of the time frame for expected results of each indicator (if varies)?</p> <p>5. Is there sufficient information to set appropriate and feasible baseline and annual/quarterly targets?</p> <p>6. Are there sufficient human and financial resources in the MCA and IEs to conduct the necessary data collection/reporting during the life of the intervention? Are data collection costs known and budgeted for?</p> <p>7. Is it clear who will use the data and for what purpose(s)?</p>	<ul style="list-style-type: none"> <li>• In the original M&amp;E plan, there were too many indicators and indicators were not sufficiently capturing the capacity building-related efforts</li> <li>• The baselines and targets were mostly marked as “TBD” (to be developed, often in 2017), depending on the completion of analyses, plans and available budget. In 2019, there was still no updated M&amp;E plan with baselines and targets for all indicators.</li> <li>• The timing of monitoring was clear</li> <li>• It is unclear if there are sufficient human resources in the MCA to conduct data collection and reporting</li> </ul>
<p><b>Are there clearly defined indicators and data sources identified for monitoring project results?</b></p> <p>1. Are there clearly defined indicators for measuring expected outcomes?</p> <p>2. Are the indicators linked to the ERR?</p> <p>3. Is it clear which indicators will be disaggregated by gender, age, income as appropriate?</p> <p>4. Is there a clear understanding of the time frame for expected results of each indicator (if varies)?</p> <p>5. Is there sufficient information to set appropriate and feasible baseline and annual/quarterly targets?</p> <p>6. Are there sufficient human and financial resources in the MCA and IEs to conduct necessary data collection/reporting during the life of the intervention? Are data collection costs known and budgeted for?</p> <p>7. Is it clear who will use the data and for what purpose(s)?</p>	<p>Strengths:</p> <ul style="list-style-type: none"> <li>• The original M&amp;E plan for the Roads Project had each program logic result covered by an indicator, disaggregated where necessary, by type of road. (For this kind of indicators disaggregation by gender, age, income is not relevant.)</li> </ul> <p>Weaknesses:</p> <ul style="list-style-type: none"> <li>• There were too many outcome indicators and the indicators were not sufficiently covering the improved planning and execution of routine and emergency maintenance outcomes. The outcomes were mostly related to improved planning and execution of periodic maintenance</li> <li>• The baselines and targets were mostly marked as “TBD” (to be developed, often in 2017), depending on the completion of analyses, plans and available budget. In 2019, there was still no updated M&amp;E plan with baselines and targets for all indicators.</li> <li>• The use and purpose of the data is not clear</li> </ul>

Project – Evaluability Assessment	
Assessment Categories	Strengths, Weaknesses, and Next Steps
<p><b>Is the evaluation clearly defined for maximizing learning and accountability?</b></p> <ol style="list-style-type: none"> <li>1. Is there commitment by all key stakeholders to implement the independent evaluation?</li> <li>2. Are evaluation questions and outcomes clearly defined and prioritized?</li> <li>3. Is it clear which outcomes will be disaggregated by gender, age, income as appropriate?</li> <li>4. Is it clear who will use the evaluation results and for what purpose(s)?</li> <li>5. Is the evaluation methodology the most rigorous and feasible possible?</li> <li>6. Is it clear how an evaluation (performance or impact) will contribute to the evidence base in the sector?</li> <li>7. Are there interim/continuous evaluation results which could help inform decisions during the compact life? If so, is such an evaluation built into the evaluation plan?</li> <li>8. Do the potential benefits and learning from an evaluation of the program outweigh the costs?</li> <li>9. Are there sufficient human and financial resources in the MCC, MCA and IEs to conduct necessary data collection/reporting during the life of the evaluation? Are data collection costs known and budgeted for?</li> </ol>	<p>Strengths:</p> <ul style="list-style-type: none"> <li>• The original evaluation questions in the original M&amp;E plan were clear and relevant, both to the project type and to the project goals</li> <li>• There is a designation of resources for an external evaluation</li> <li>• A post-Compact ERR of the Roads Project is planned to be calculated</li> </ul> <p>Weaknesses:</p> <ul style="list-style-type: none"> <li>• The M&amp;E plan wanted the independent evaluation to measure four key outcomes that do not cover the improved planning outcomes of the Project objective statement and which imply that roads have actually been maintained:             <ul style="list-style-type: none"> <li>○ Result: Improved quality of road network; Indicator: Roughness</li> <li>○ Result: Prolonged life of road network; Indicator: Roughness</li> <li>○ Result: Decreased vehicle operating costs; Indicator Vehicle operating costs on maintained roads</li> <li>○ Result: Decreased travel time; Indicator: Travel time on maintained roads</li> </ul> </li> </ul>

## XII. ANNEX II: REFERENCES

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## **XIII. ANNEX III: LEVEL I HIGHWAY DEVELOPMENT AND MANAGEMENT-4 (HDM-4) CALIBRATION REPORT**

### **A. INTRODUCTION**

#### **Overview**

The Millennium Challenge Corporation (MCC) and the Government of Liberia (GOL) signed a \$257 million dollar Compact in October 2015 that entered into force in January 2016, targeting the energy and the road sectors. The Compact objective is to “provide (a) access to more reliable and affordable electricity and (b) improve the planning and execution of routine, periodic and emergency road maintenance.”<sup>35</sup>

The Roads Project included in the Compact (budgeted at approximately \$21 million) is MCC’s first maintenance-only investment that aims to build institutional systems and capacity for sustainable road maintenance practices. At its design, the project comprised of two activities: 1) the National Road Maintenance Activity aimed to pilot, construct, and equip at least two regional maintenance centers, and matching the GOL’s contributions to periodic maintenance through a Matching Road Maintenance Fund, and 2) the Roads Sector Reform Activity focused on building the capacity of the existing and newly created road maintenance institutional systems.

#### **Objective of the Report**

On April 14, 2019, MCC issued a contract to International Development Group LLC (IDG) to conduct an Economic Analysis and Independent Evaluation Services in support of the Liberia Roads Project. The evaluation is mainly three-fold and interwoven: 1) a review of the activity implementation (Research Area 0) to identify any deviations from the original design, 2) an economic analysis (Research Area 1) to understand the costs and the benefits of the MCC-supported roads, and 3) performance evaluations of road maintenance, road usage pattern, and transport market structure to complement the knowledge gained through the economic analysis (Research Area 2, 3, and 4).

The economic analysis portion of the services will use the Highway Development and Management (HDM-4), originally developed by the World Bank. HDM-4 model was developed as a generic model for use in economic analysis and needs to be calibrated for application in each country. There are different levels of calibration used in HDM-4 application depending on the use of the model and in order to use the HDM-4 model for the analysis, MCC requires the evaluator to perform a Level 1 HDM-4 calibration. This report presents the approach to Level 1 HDM-4 calibration and includes a review of past work done in Liberia and available data. The report also presents any additional data collection, analysis and any updates needed to meet the HDM-4 Level 1 calibration requirement.

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<sup>35</sup> Millennium Challenge Corporation, Millennium Challenge Compact between the United States of America acting through the Millennium Challenge Corporation and the Republic of Liberia acting through the Ministry of Finance and Development Planning, 2015, p.1.

## **Introduction to HDM-4**

HDM is essentially an analytical tool for engineering and economic assessment of:

- road investment and maintenance strategies
- viability of road investments in terms of savings in vehicle operating, time and road maintenance costs
- transport pricing and regulation
- network program optimization
- budget strategy analysis

HDM is based on physical and economic relationships derived from research in road deterioration, mainly resulting from traffic volumes and characteristics (such as axle loadings), environment and the effects of maintenance activities. In its core, HDM-4 economic analysis is a cost-benefit analysis; it compares the cost streams for the existing “without-project” situation and the proposed “with-project” road upgrading or improvement situation.

HDM operates in three phases:

- calibration, data input and diagnostics phase, in which input data are generated and examined;
- simulation phase, in which traffic flows and changes in road conditions from initial construction through annual cycles of use, deterioration and maintenance are analyzed; and
- economic analysis and comparison phase, during which alternative construction and maintenance policies are analyzed and compared to the base case for selected groups and road links.

HDM computes:

- deterioration of paved and unpaved roads for a set of specified road agency strategies;
- road user costs as a function of the roadway and vehicle characteristics; and
- time-streams of road agency and user costs for the specified strategies.

It compares these strategies by presenting relevant economic indicators such as economic rate of return, net present value, and benefit cost ratio.

The HDM analysis is carried out over the engineering design life of the road project and considers all quantifiable costs and benefits to the road agency and road users. The road agency cost includes primarily the road construction and maintenance costs. The road user costs include vehicle operation cost, travel time, cost of road crashes, and environmental cost of vehicle emissions etc. The cost streams for road agency and road users will be generated for each project option included in the analysis and the cost and benefit streams for the project option will be generated to calculate the economic indicators.

## **HDM-4 Calibration**

There are three levels of HDM-4 calibration which requires low, moderate, and high-level effort and resources respectively depending on its level of rigor:

### **1) Level 1 - Basic Application**

Determines the values of required basic input parameters, adopts many default values, and calibrates the most sensitive parameters with best estimates, desk studies or minimal field surveys.

## **2) Level 2 - Calibration**

Requires measurement of additional input parameters and moderate field surveys to calibrate key predictive relationships to local conditions. This level may entail slight modification of the model source code.

## **3) Level 3 - Adaptation**

Requires major field surveys and controlled experiments to enhance the existing predictive relationships or to develop new and locally specific relationships for substitution in the source code of the model.

### **Level 1 Calibration**

Level 1 is the specified calibration level for the Liberia evaluation. As part of the Roads Sector Reform Activity under the Roads Project included in the Liberia Compact, The United States Department of Transportation, John A. Volpe National Transportation Systems Center (“Volpe”) undertook several activities to implement improved maintenance planning in Liberia and use HDM-4 for maintenance planning. Under this activity, HDM-4 Level 2 calibration was carried out and the Road Maintenance Management Unit (RMMU) staff within the Infrastructure Implementation Unit of the Ministry of Public Works (MPW) were trained to use HDM-4. The trainings aimed to enable the staff to use HDM-4 to plan and develop the preliminary five-year (2019-2023) and one-year road maintenance program for 2019. With a Level 2 calibration already carried out and being used by the MPW for its maintenance planning, it is prudent to review and adopt the same Level 2 calibration while including any updates needed for the current evaluation. This approach was agreed with MCC and the calibration exercise will be primarily based on the Level 2 calibration done by Volpe and adopted by MPW. As recommended by the publication “HDM-4 A Guide to Calibration and Application”, it will be assumed that where sufficient data is not available for calibration, the default HDM parameters are appropriate for local conditions in Liberia.

Besides adopting the Volpe HDM-4 calibration results after the results were reviewed and updated as needed, Level 1 calibration also includes determining the values of the model’s basic input parameters with respect to the key variables within each of the HDM-4 modules: **Road Network**, **Vehicle Fleet**, and **Road Works**. It can be summarized that the following categories of data, which relate to the three HDM-4 modules, will need to be defined for a Level 1 calibration:

- Road characteristics and pavement condition;
- Vehicle fleet characteristic data and unit costs;
- Traffic characteristics and growth rates;
- Regional climatic type;
- Road works data and unit costs (i.e. improvement and maintenance works); and
- Economic analysis data (i.e. discount rates and analysis period).

The objective of this Level 1 HDM-4 Calibration Report is to present a reliable starting point for applying the HDM-4 model for the economic evaluation of the Liberia Roads Project. The HDM model used by MPW for maintenance planning will form the basis for the evaluation and therefore

the road network data in the MPW HDM-4 model will be used as the base road network data. The report will discuss and present data and/or sources to be used within the above categories as recommended for a Level 1 calibration and a review of Level 2 calibration parameters adopted for the MPW HDM 4 model and any updates needed in the Level 1 or Level 2 parameters.

## **B. ROAD CHARACTERISTICS CALIBRATION**

### **Road Network Parameters**

In the Road Network module of HDM-4, the existing functional, physical, geometric and structural engineering characteristics of the road network, prior to the investment, can be defined. For the current analysis, data on the entire national road network is needed to analyze the impact of the maintenance approach before and after the MCC investment under the Roads Project. The data input required to define the physical road characteristics and pavement conditions of the national road network will include several parameters covering road characteristics and pavement details. The national road network database developed by the MPW's RRMU unit for maintenance planning, with support from Volpe, will be used in the evaluation.

### **Review of Volpe RDWE Model Calibration**

The Volpe team undertook Level 2 calibration of the Roadway Deterioration (RD) model parameters and Works Effect (WE) model for both bituminous and gravel surfaced roads<sup>36</sup>. The calibration used 44 bituminous sections and 81 unsealed road sections covering low, medium, and high traffic levels and climatic zones. The sample size in each group of bituminous sections covered is not large and over the years as more data is available, the parameters derived need to be updated. The detailed database and derivation of values were not provided with the report. It is important that once every 2-3 years, additional observations to be added to the database and calibration factors to be updated with more information on roadway performance.

The RD calibration parameters were derived based on observed and predicted deterioration to reflect the observed deterioration. Observations on the sample road sections and interviews with MPW managers were used in this exercise. Where data and details required to make an assessment, HDM-4 default parameters were adopted. The calibration parameters derived will improve the predictive ability of the model but need to be improved over time to be more representative of the Liberian road network. Since the parameters are developed from limited data points, regular updates are essential to improve the predictive ability of the model.

The WE model calibration included the definition of maintenance and improvement options, unit costs, and construction quality indicators for both bituminous and unsealed pavements. The WE model definitions are acceptable and shall be used in the evaluation.

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<sup>36</sup> Draft RWDE Calibration Summary Report, March 2019

## C. ROAD USER EFFECTS (RUE) MODEL CALIBRATION

The Volpe team undertook Level 2 calibration of the Road User Effects (RUE) model parameters for Liberia.<sup>37</sup> The calibration details provided in the Volpe report were reviewed for their appropriateness for adoption for the evaluation.

### Vehicle Fleet Characteristics and Unit Costs

In the Vehicle Fleet module of HDM-4, the characteristics and price/cost values of the vehicle fleet together with the traffic growth sets for each of the vehicle classes must be defined. Setting up the Vehicle Fleet module involves defining the following key parameter groups: (i) vehicle categories and representative vehicle models; (ii) vehicle characteristics and operating costs; and (iii) value of time.

### Vehicle Categories

The modelling of vehicle fleets in HDM-4 is done through defining a set of vehicle categories that reflect the actual traffic composition being evaluated. HDM-4 includes 20 default vehicle types, for which the models for vehicle speed, road user effects, and social and environmental effects have been developed. The default vehicle types fall into the following two categories:

- 1) Motorized Vehicles: motorcycle, car (small/ medium/ large), light delivery vehicle, light goods vehicle, four-wheel drive, truck (light/ medium/ heavy/ articulated), bus (mini/ light/ medium/ heavy), and coach.
- 2) Non-motorized Vehicles: pedestrian, bicycle, rickshaw, and animal cart.

**Vehicle Categories:** The vehicle categories considered in the Volpe report are given in Table XIII-i.

**Table XIII-i: Vehicle Categories Adopted in the Volpe Report**

Class	Category
1	Car
2	Taxi
3	Pickup/ SUV
4	Small Bus
5	Medium/ Heavy Bus
6	Small Truck
7	Medium Truck
8	Heavy Truck
9	Articulated Truck
10	Motorcycle/Keke

The vehicle categories adopted are based on the study of the vehicle fleet used in Liberia and hence adopted for our evaluation.

**Representative Vehicle Models.** As modelling of each individual vehicle is impossible, each vehicle category defined will be represented by a representative vehicle model. The technical, operational and economic characteristics of the representative vehicle model will represent that of

<sup>37</sup> Draft RUE Calibration Summary Report, December 2018

the entire vehicle category. For example, for the “Car” category, if the most common type of vehicle model in this category is determined to be a Toyota Corolla, then the technical, operational, and economic costs of this vehicle model will be assumed for the entire “Car” vehicle category. However, the Volpe report gives no details of vehicle model used in developing the RUE model parameters. The detailed data collected for deriving RUE model parameters were also not provided and therefore details could not be verified. Defining a vehicle model will help in updating the data in subsequent years. The report provides the results of RUE calibration but does not provide the data and calculations. Detailing how model parameters are derived will help in adopting a standard approach by the MPW when updating the RUE model parameters. Availability of such information will be verified during the evaluation.

### **Vehicle Characteristics and Operating Costs**

The technical and operational characteristics of each vehicle category include variables such as the price of vehicles, tires, lubricants and fuels, as well as maintenance and vehicle operation staff (crew) costs. These data were collected by conducting Vehicle Operating Cost (VOC) surveys by Volpe. Training on VOC data collection was provided to MPW staff. Typical data sources for the VOC surveys include: quotes from vehicle dealerships and suppliers of products such as tires; consultation with other transportation experts; interviews with garages and vehicle servicing businesses; insurance companies; wage data of drivers and crew members of public transport vehicles and freight trucks; consultation with public transport agencies (if any); and a review of published literature and other data sources. Costs would then be calculated as economic costs and will be exclusive of taxes and subsidies. The report provides values for all vehicle categories but does not explain how vehicle operating characteristics and economic costs were derived. It is important that these details are explained in the report so that other users can use the information with confidence.

The data on vehicle price indicated in the report is the average purchase cost of a new vehicle and it is not clear if transfer prices such as taxes have been excluded. The average cost of fuel is given as US \$1.00 per liter which seems to include all the taxes as the economic cost of fuel is well below US \$1.00 per liter. The backup road user cost survey data and analysis need to be reviewed before adopting the vehicle operating cost data for the evaluation.

Other vehicle characteristics data such as physical characteristics, utilization and service life are derived from primary and secondary sources and can be adopted in the evaluation.

### **Desired Speed**

The HDM-4 model shall be run on the road section with average characteristics reflecting the conditions for the average speed estimates. The predicted free speed shall be compared to the average speed estimate and the value for VDESIR used in the modelling, adjusted by the ratio of the predicted speed to the estimated speed. After several runs of the model the predicted and estimated speeds should be the same. Average journey speeds observed are given in the report which may be adopted in the analysis.

### **Value of Time**

The Volpe report presents the value of time derived from both secondary source and primary survey of incomes. The secondary source used to obtain salary range and distribution is the household income and expenditure survey data was published by the Liberia Institute of Statistics and Geo-Information Services in August 2017. The Volpe team has trained MPW staff to conduct

travel time cost surveys and carried out surveys to derive salary ranges. The tables providing data in the report from both secondary and primary sources (Table 2.5 and Table 2.7 on page 5 of the Draft RUE Calibration Summary Report (2018)) present similar data though the median worker wage reported is different. It is assumed that the data shown in one of the tables may be a mistake. The median average wage reported by these two sources is US \$ 0.44 and 0.36 per hour before adjusting for shadow wage rate factor and employment overheads. As suggested by the World Bank research note, a single national value of time is given for all passengers without differentiating between car, bus and two wheeler passengers and employment overheads (EOH) and shadow wage rate factor (SWRF) is applied to arrive at the value of time. After applying the EOH and SWRF, the suggested value of time is US\$ 0.4 per hour for time saved during work related trips and US\$ 0.12 per hour for time saved during non-work related trips.

The report do not give details of how SWRF was derived. SWRF is normally applied to unskilled worker wages and not across all wage groups. Also adopting a single value across all vehicle types may not be appropriate. The single value of time for the entire nation for each vehicle category may be a better approach, therefore a separate value of time for car, bus and motorcycle passengers may be adopted. The value of time calculations will be reviewed with additional secondary data and updated.

### **Cargo Delay Cost**

The Volpe report recommends to adopt cargo delay time at 2.0 times the passenger value of time which will be US\$ 0.8 per hour.

### **Road User Effects Model Calibration**

The road user effects model calibration undertook calibration of key and most sensitive model parameters for fuel consumption, lubricant consumption, tire wear parts consumption, labor hours, capital costs, crew costs and overhead costs constituting the vehicle operating costs. The report provides the derived calibration factors which is adopted in the HDM-4 model. The team did not receive the database or analysis used in the calibration or any detailed description of how these model parameters can be updated in subsequent years. The availability of such documentation will help in future updates.

## D. TRAFFIC AND ECONOMIC ANALYSIS DATA

Traffic is a critical input to the HDM-4 modeling. Traffic data is calculated as classified Annual Average Daily Traffic (AADT) for a specified year. The Volpe team has conducted classified traffic volume counts and also used available data to generate traffic data for the road network. The data as adopted by the MPW for the HDM-4 model used in maintenance planning is suitable for use in the evaluation.

### **Traffic Growth**

Estimates of annual traffic growth must also be specified within the Vehicle Fleet module. There are no reports available on estimating the traffic growth rates to be used in the analysis. The HDM model indicates a growth rate of 11 percent and 6 percent adopted for all vehicle types during the analysis period. In the absence of any analysis or reporting available explaining the basis for adopting these growth rates, the growth rate to be adopted by the evaluation need to be further reviewed as part of the evaluation analysis based on any historical data available on traffic growth or related to transport demand and economic growth.

Empirical evidence shows that transport demand tends to expand at a somewhat faster rate than the economic growth rate as measured by national and regional GDPs.<sup>38</sup> This relationship is called transport demand elasticity and shall be derived by relating past GDP growth and traffic growth of the Liberian road network. Also, vehicle registration growth is an indicator of traffic growth and past data on vehicle registration growth will also be used to develop transport demand elasticity.

### **Economic Analysis Data**

**Discount Rate:** A discount rate of 10% is proposed for this evaluation. This is the standard rate used by MCC. The interest rate in Liberia, as reported in Volpe report, is 14%.

**Evaluation Period:** The evaluation period will commence when the Compact started, in this case year 2016. The project is currently ongoing and its impact in terms of adopting maintenance plans developed using HDM-4 is expected in 2020. Considering 2020 as the start of project benefits and considering 20 years as the benefit period, the evaluation period will extend to 2039. The evaluation will use constant prices, as is common practice in HDM-4 evaluations, to a 2019 base.

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<sup>38</sup> Fouquet, R. (2012) 'Trends in income and price elasticities of transport demand (1850-2010).' Energy Policy 50: 50-61

## **E. CONCLUSIONS**

The economic evaluation of the MCC investment in Liberia will be undertaken by comparing the network wide net vehicle operating cost and travel time savings with improved maintenance planning. The HDM-4 model will be used in the evaluation of maintenance scenarios. As a first step in the evaluation, MCC requires a Level 1 calibration of the HDM-4 model. The Roads Project funded under the Liberia Compact supported the MPW in developing a Level 1 and Level 2 calibration and implemented the HDM-4 model for maintenance planning. The IDG evaluation team reviewed the HDM-4 model calibration undertaken under the Roads Project to identify any updates needed.

The Level 2 calibration included both roadway deterioration and road user effects model calibration. As mentioned in the report, the calibration factors are developed from limited network observations, therefore updates in subsequent years will help improve the model performance. The team did not get the detailed data and analysis used in the calibration which can help in future updates. The availability of this information and capacity of MPW to conduct future updates of the calibration factors will be explored in the data collection phase.

Among the calibration factors reviewed, the approach used in deriving the economic cost of various vehicle operating cost components were not clearly defined and based on the values given for fuel cost, the approach does not seem to have adopted the principles of deriving economic user costs. This needs to be further studied and updated during the data collection phase. The other parameters that need review and update during the data collection phase are the value of time and traffic growth rates.

## **XIV. ANNEX IV: STAKEHOLDER COMMENTS AND EVALUATOR RESPONSES**

Stakeholder comments and evaluator responses are removed from the external version of the EDR.

## **XV. ANNEX V: EDR BUDGET TEMPLATE**

The EDR budget template is removed from the external version of the EDR.