

**JOINT TERMINAL EVALUATION REPORT  
ON THE PROJECT FOR THE OPERATION AND  
MAINTENANCE OF THE SINDHULI ROAD**

Kathmandu, August 27, 2015

Japan International Cooperation Agency (JICA)

IC Net Limited

EI
JR
15-229

# Contents

<b>1. Introduction .....</b>	<b>1</b>
1.1 Background.....	1
1.2 Objectives of the Terminal Evaluation .....	1
1.3 Joint Terminal Evaluation Study Team.....	2
1.4 Outline of the Project.....	2
1.5 Schedule of the Terminal Evaluation Study.....	3
1.6 Methodology of the Terminal Evaluation .....	4
<b>2. Achievement of the Project.....</b>	<b>5</b>
2.1 Inputs .....	5
2.1.1 Nepalese side.....	5
2.1.2 Japanese side .....	5
2.2 Outputs.....	6
2.3 Project Purpose .....	19
2.4 Overall Goal.....	22
<b>3. Implementation Process of the Project .....</b>	<b>25</b>
<b>4. Results of Evaluation with Five Evaluation Criteria.....</b>	<b>28</b>
4.1 Relevance.....	28
4.2 Effectiveness .....	29
4.3 Efficiency.....	30
4.4 Impact (Prospects) .....	31
4.5 Sustainability (Prospects) .....	31
<b>5. Conclusion .....</b>	<b>34</b>
<b>6. Recommendations.....</b>	<b>34</b>
6.1 Recommendations to be implemented during the Project period .....	34
6.2 Recommendations to be implemented after the termination of the Project.....	35
<b>7. Lessons Learned .....</b>	<b>36</b>

## Abbreviations

ARMP	Annual Road Maintenance Plan
CAD	Computer Aided Design
C/P	Counterpart
DBST	Double Bituminous Surface Treatment
DOR	Department of Roads
DWIDP	Department of Water Induced Disaster Prevention
EIS	Emergency Information System
FY	Fiscal Year
GOJ	Government of Japan
GON	Government of Nepal
HMIS	Highway Management Information System
JICA	Japan International Cooperation Agency
M/M	Minutes of Meeting
MOPIT	Ministry of Public Infrastructure and Transport
OFC	Optical Fiber Cable
PCC	Project Coordinating Committee
PDM	Project Design Matrix
RBN	Roads Board Nepal
R/D	Record of Discussion
SDI	Surface Distress Index
SRDPU	Sindhuli Road Disaster Prevention Unit
SRMU	Sindhuli Road Maintenance Unit

## **1. Introduction**

### **1.1 Background**

The Sindhuli Road is one of the most important arterial roads in Nepal, linking Kathmandu City, the capital of the country, with the Terai region in southern Nepal. The road, with the length of 160 km in total from Bardibas to Dhulikhel, has four sections. The Project for the Construction of the Sindhuli Road consisting of the construction of bridges and causeways in the Section I, and roads in the Section IV and the Section II, was undertaken with the grant aid of the Government of Japan (GOJ) from 1996 to 2003. The construction of the Section III started in 2009 with the grant aid of the GOJ and is supposed to be completed in 2015.

During and after the construction, the Sindhuli Road has been affected by many sediment-related disasters. Most of the damaged sections have been rehabilitated properly, but some have not been. Full traffic operations will not be sustained even after full opening of the road if effective countermeasures are not implemented. Currently, the road is operated and maintained by the Sindhuli Road Project Office of the Department of Roads (DOR) Foreign Cooperation Branch under the Ministry of Physical Infrastructure and Transport (MOPIT)<sup>1</sup>. After the completion of the construction work, the operation and maintenance of the road will be transferred to the Division Road Offices under the Maintenance Branch of the DOR. However, the Sindhuli Road Project Office and these Division Road Offices have neither a proper operation and maintenance system nor adequate knowledge and experiences of countermeasures for disasters. Therefore, it is necessary to strengthen their management capacities and technical capacities to implement systematic countermeasures for disasters.

Accordingly, the Government of Nepal (GON) requested that the GOJ carry out a technical assistance project to strengthen the road maintenance system and improve management and technical capacities including disaster countermeasures. Upon this request, Japan International Cooperation Agency (JICA) has dispatched the Preliminary Study team in July 2009 to formulate and agree on the detailed design of the Project for the Operation and Maintenance of the Sindhuli Road (hereinafter referred to as “the Project”) and the official Record of Discussion (R/D) was signed on August 2, 2011 accordingly. It was also agreed that the staff members of the Department of Water Induced Disaster Prevention (DWIDP) under the Ministry of Irrigation and the Roads Board Nepal (RBN) were counterparts (C/P) of the Project. The Project started from January 2012 as a four-year technical cooperation project. As the Project will terminate in January 2016, the Terminal Evaluation Study was conducted from August 16 to 30, 2015.

### **1.2 Objectives of the Terminal Evaluation**

- (1) To confirm progress of the Project and examine achievement of the Project Purpose by the end of the Project

---

<sup>1</sup> The name of the Ministry was changed from the Ministry of Physical Planning, Works and Transport Management to the Ministry of Physical Infrastructure and Transport in accordance with the approval of the Cabinet in Feb 21, 2013.

- (2) To clarify the priority issues and challenges by the end of the Project
- (3) To assess the Project based on the five criteria such as relevance, effectiveness, efficiency, impact, and sustainability
- (4) To make recommendations to be implemented by the end of the Project and after the termination of the Project
- (5) To obtain lessons learned from the Project for better implementation of other projects

### 1.3 Joint Terminal Evaluation Study Team

The Joint Terminal Evaluation Study Team (hereinafter referred as “the Team”) consists of the following members:

#### [Nepalese Side]

Name	Title	Affiliation
Mr. Rupak Rajbhandari	Evaluation Member	Senior Divisional Engineer, Foreign Co-operation Branch, DOR, MOPIT
Mr. Sanu Babu Prajapati	Evaluation Member	Senior Engineer, Operation, Monitoring and Evaluation, RBN

#### [Japanese Side]

Name	Title	Affiliation
Mr. Hiroshi Takeuchi	Leader	Director, Transport and ICT Group, Infrastructure and Peacebuilding Dept., JICA
Mr. Hidetaka Sakabe	Cooperation Planning	Deputy Director, Transport and ICT Group Infrastructure and Peacebuilding Dept., JICA
Ms. Toshiko Shimada	Evaluation Analysis	Consultant, IC Net Limited

### 1.4 Outline of the Project

The Project was conducted based on the PDM Version 0, and 1.<sup>2</sup> During the Mid-Terminal Evaluation in January 2004, the PDM was revised to the PDM 2. The summary of the PDM Version 2 is described below.

#### (1) Overall Goal

Safe and smooth road traffic along the Sindhuli Road is secured.

#### (2) Project Purpose

Routine, recurrent, periodic, and emergency maintenances along the Sindhuli Road come to be promoted by the Department of Road (DOR) and Department of Water Induced Disaster Prevention (DWIDP).

<sup>2</sup> The PDM 0 was agreed in the R/D dated on August 2, 2011. It was revised to the PDM1 in September 2012.

### (3) Output

Output 1	The operation and maintenance system of the Sindhuli Road is developed.
Output 2	The road management system of the Sindhuli Road regarding disasters, traffic accidents, etc. is established.
Output 3	The coordination between the DOR and DWIDP as well as the knowledge and skills of the countermeasure works for disasters are improved.

### 1.5 Schedule of the Terminal Evaluation Study

Date	Programme
Aug 16 (Sun)	22:30 Arrival of Ms. Shimada KTM (MH114)
Aug 17(Mon)	10:00 Meeting with the Expert Team (SRMU Project Office)
Aug 18 (Tue)	9:30 Meeting with the JICA Nepal Office 14:00 Interview with Mr. Bharat Kaji Deoju (DOR. Project Manager), 15:00 Interview with Mr. Madhav Prasad Adhikari (DOR. Deputy PM), 16:00 Interview with Ms. Shila Shresta (DOR)
Aug 19(Wed)	10:00 Interview with Mr. Rana (expert) 14:00 Interview with Mr. S.C. Amatya and Mr. Krishna Pandey (DWIDP) 15:30 Interview with Mr. Krishna Singh Basnet (RBN)
Aug 20 (Thu)	13:00 Interview with Mr. Ramesh Acharya (DOR)
Aug 21 (Fri)	10:30 Meeting to discuss the indicators of the Overall Goal of PDM among the C/Ps, experts and evaluation team. 13:20 Interview with Mr. Ram Kumar Shrestha (DOR)
Aug 22 (Sat)	Document preparation
Aug 23 (Sun)	Document preparation
Aug 24 (Mon)	Arrival of Mr. Sakabe 14:30 Internal meeting at JICA Nepal Office 15:30 Internal meeting with the experts at JICA Nepal Office
Aug 25 (Tue)	10:00 Internal Joint Evaluation Meeting at JICA Nepal Office : Discussions on the draft of Joint Terminal Evaluation Report 14:00 Meet Meeting with C/Ps and the Japanese experts to discuss the draft of Joint Terminal Evaluation Report at JICA Nepal Office
Aug 26 (Wed)	Arrival of Mr. Takeuchi Finalization of the Joint Mid-Term Review Report 10:30 Courtesy call to Executive Director of RBN and discussion on Minutes/Meeting (M/M) 13:30 Courtesy call to Director General of DWIDP and discussion on M/M 14:30 Courtesy call to Director General of DOR and discussion on M/M
Aug 27 (Thu)	10:30 Site visit to SR Road (JICA Team only) 14:00 7 <sup>th</sup> Project Coordinating Committee Meeting Presentation on results of the Terminal Evaluation Signing of M/M for the Terminal Evaluation
Aug 28 (Fri)	9:00 Report to JICA Nepal Office 12:20-23:30 Kathmandu-Kuala Lumpur (MH171) Mr. Takeuchi 13:30-22:45 Kathmandu-Bangkok (TB 320) Mr. Sakabe
Aug 29 (Sat)	Kuala Lumpur-Narita (MH088) Mr. Takeuchi, Bangkok-Haneda (TG 640) Mr. Sakabe 12:20-23:30 Kathmandu-Kuala Lumpur (MH171) Ms. Shimada
Aug 30 (Sun)	Kuala Lumpur-Narita (MH088) Ms. Shimada

## 1.6 Methodology of the Terminal Evaluation

The Project was evaluated using Project Cycle Management method defined in the New JICA Guidelines for Project Evaluation First Edition (2010) and the Second Edition (2014). The procedures for the Terminal Evaluation were as follows:

- (1) The Team reviewed the PDM Version 2 and developed an Evaluation Grid (See the ANNEX 1 and 2).
- (2) The Team collected the necessary data for evaluation by reviewing the project reports and the relevant documents, and undertaking a questionnaire survey and an interview with the counterparts (C/Ps) and the Japanese experts of the Project.
- (3) The Team verified and evaluated the achievements as per the PDM Version 2 and implementation processes of the Project by referring to the Evaluation Grid.
- (4) The Team evaluated the Project based on the following five criteria of Development Assistance Committee:

<b>Relevance</b>	Relevance refers to the validity of the Project Purpose and the Overall Goal in accordance with the policy direction of the GON and the Japanese Official Development Assistance as well as needs of beneficiaries and target groups.
<b>Efficiency</b>	Efficiency refers to the productivity of the implementation process, examining if the inputs of the Project were efficiently converted into the Output.
<b>Effectiveness</b>	Effectiveness refers to the extent to which the expected benefits of the Project have been achieved as planned, and examines if the benefit was brought about as a result of the Project.
<b>Impact</b>	Impact refers to direct and indirect, positive and negative impacts caused by implementing the Project, including the extent to which the Overall Goal has been attained.
<b>Sustainability</b>	Sustainability refers to the extent to which the Nepalese side can further develop the Project, and the benefits generated by the Project can be sustained in the policy, financial, institutional, organizational and technical aspects.

- (5) The Team made a conclusion based on the results of evaluation analysis. Also, the Team made recommendations to the Project, and obtained lessons learned from the Project.

## **2. Achievement of the Project**

### **2.1 Inputs**

#### **2.1.1 Nepalese side**

1. At the time of the Terminal Evaluation, 12 officials were assigned by the DOR, the DWIDP and the RBN as the main C/Ps of the Project. The total number of the C/Ps assigned for the Project by the time of the Terminal Evaluation stood at 23 people (See ANNEX 4).
2. The RBN allocated NRs 197.1 million and the DOR allocated NRs 791.2 million from FY 2012/13 to FY 2015/16. The total amount of the budget for the last four years (FY 2012/13 – FY 2015/16) was approximately NRs 988.4 million, out of which NRs 40.7 million were paid for the implementation of 14 Priority Projects under the Project. The DWIDP also paid NRs 26.4 million for the implementation of 4 Priority Projects. (See ANNEX 5).
3. The office at the Heavy Equipment Division at Naya Baneswar in Kathmandu was provided by the DOR for the Sindhuli Road Maintenance Unit (SRMU). The office space was also provided by the DWIDP for the Sindhuli Road Disaster Prevention Unit (SRDPU).

#### **2.1.2 Japanese side**

1. Sixteen (16) JICA experts were dispatched. Their professional fields are as follows: 1) Chief Advisor/Road Maintenance Management, 2) Road Disaster Prevention Plan 1, 3) Road Administration, 4) Support for Self-Reliance/Road Disaster Prevention Plan 2, 5) Organization /Economic Analysis, 6) Traffic Safety/Equipment Plan 1, 7) Financial Analysis, 8) Road Disaster, 9) Landslide/Environmental Impact Assessment, 10) Information and Communication,<sup>3</sup> 11) Coordinator, 12) Coordinator/Road Maintenance Management Support, 13) Road Disaster Prevention Plan 3 14) Equipment Plan 2 and 15) Equipment Plan 3. The total man-months for the Japanese experts were 95.07 as of August 31, 2015 (See ANNEX 6).
2. The Japanese side has allocated 54.6 million yen, i.e., NRs 44.4 million<sup>4</sup> in total for the program budget for the Project activities such as the implementation of the Pilot Projects, traffic surveys, training in Japan, and so on (See ANNEX 7).
3. The Japanese side provided EIS, vehicles, automatic rain gauges, computers, digital cameras and other equipment required for project activities. The emergency maintenance equipment was being procured at the time of the Terminal Evaluation. The total cost for equipment provided by the Japanese side stood at about 58.9 million yen, i.e., NRs 47.9 million<sup>5</sup> (See ANNEX 8).
4. The Project conducted counterpart training, “Technical Visit and Dialogue Program for Operation and Maintenance of Sindhuli Road for Counterpart of Nepal”. Nine (9) members from DOR,

---

<sup>3</sup> The two experts were assigned.

<sup>4</sup> Exchange rate was adopted according to JICA’s procurement rate (NPR1=\\1.229 in August 2015).

<sup>5</sup> Exchange rate was adopted according to JICA’s procurement rate (NPR1=\\1.229 in August 2015).



DWIDP, RBN and Hetauda Road Division participated in this training (See ANNEX 9).

## 2.2 Outputs

The degree to what each output has been achieved is described below:

<b>Output 1:</b>	<b>The operation and maintenance system of the Sindhuli Road is developed.</b>
------------------	--

The following indicators were defined in order to evaluate the achievement of the Output 1:

<b>Indicator 1-1</b>	<b>Road Inventory, and disaster and maintenance records are developed and updated.</b>
----------------------	--

Before implementation of the Project, there was no comprehensive road inventory of the Sindhuli Road. The Project has developed a format of the road inventory in September 2013, and collected the data and information from the Project for the construction of Sindhuli Road and the DOR. The staff members of the SRMU employed by the Project have updated the road inventory, and disaster and maintenance records. This work will be completed by the end of December 2015. Thus, the Indicator 1-1 will be achieved.

<b>Indicator 1-2</b>	<b>Annual Road Maintenance Plan (ARMP) is prepared taking into consideration of the maintenance and disaster records.</b>
----------------------	---

In the first year of the Project, the DOR prepared the ARMP of the Sindhuli Road for Fiscal Year (FY) 2012/2013 based on the Japanese experts' suggestion that more budget for periodic maintenance need to be allocated. Since the second year of the Project, the DOR has confirmed that current situation of damaged places that need to be maintained at the monthly meetings of SRMU, and formulated the ARMP with the supporting documents in an appropriate and systematic manner. The Indicator 1-2 has been already achieved.

The Table 1 presents the allocated budget from FY 2012/13 to FY 2015/16. The approved budget has decreased because of the fiscal austerity. According to the RBN, the budget is enough for the DOR because the DOR has not fully implemented the allocated budget every year.

<b>Table 1: Annual Road Maintenance Plan from FY 2012/13 to FY2015/16 (Unit: NRs)</b>					
<b>Source of Budget</b>	<b>Maintenance Activity</b>	<b>Allocated Budget for FY 2012/13</b>	<b>Allocated Budget for FY 2013/14</b>	<b>Allocated Budget for FY 2014/15</b>	<b>Allocated Budget for FY 2015/16</b>
RBN	Routine Maintenance	8,178,029	8,175,000	10,858,600	12,546,000
	Recurrent Maintenance	7,730,000	8,367,000	12,838,000	11,427,000
	Periodic Maintenance	22,500,000*	0	49,200,000	0
	Emergency Maintenance	500,000	10,500,000	0	2,500,000
	Specific Maintenance	4,500,000	9,810,000	10,000,000	6,000,000
	Road Traffic Safety works	0	0	0	1,000,000
	Bridge Maintenance	0	0	0	0
	Bio-Engineering	0	0	0	500,000
GON (DOR Budget)	GON budget can be allocated for activities undertaken by the Project such as reconstruction, rehabilitation, major repair works and administrative expenses.	247,323,557	207,149,000	147,317,000	189,500,000
	<b>Total</b>	<b>290,731,586</b>	<b>244,001,000</b>	<b>230,213,600</b>	<b>223,473,000</b>

Source: Data obtained from the Banepa-Sindhuli-Bardibas Road Project ARMP 2012/2013, 2013/2014, 2014/2015, 2015/2016 and data obtained from the DOR and the RBN.

Note: \* 90 % of the expenditure for this periodic maintenance works was paid by Central Regional Office, DOR and GON while 10% of that was paid by World Bank.

<b>Indicator 1-3</b>	<b>Specific maintenance including disaster prevention work as well as emergency maintenance including emergency response are conducted.</b>
----------------------	---

This Indicator was added in the revised PDM at the time of the Mid-Term Review Study because specific maintenance and emergency maintenance are major works. The DOR has immediately conducted recurrent and specific maintenance works when road closures happened in the Sindhuli Road. As shown in the Table 2, the frequency of recurrent and specific maintenance works has gradually increased in the Section IV. Particularly, the DOR frequently need to take countermeasures against the debris flow generated near the causeways. Regarding the emergency maintenance, the C/P of DOR visited the several places in Sindhuli Road immediately after the massive earthquake occurred in April 2015 to grasp the situation of damages caused by this earthquake. In some place of the Section II, this C/P made a temporary path to avoid the damages, and also took an immediate action that enables the one lane at least to be used to ensure the effective and safe traffic. Such efforts of emergency maintenance have considerably contributed to minimizing the influence of road closures caused by the earthquake. It can be said that the Indicator 1-3 has been achieved.

	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015*</b>
Section I	9 places	4 places	7 places	1 place
	20 times	13 times	23 times	1time
Section II	1 place	0	0	0
	1 time	0	0	0
Section III	Under construction	Under construction	6 places	2 places
			6 times	2 times
Section IV	2 places	4 places	6 places	1 place
	3 times	11 times	27 times	1 time
Total	12 places	8 places	19 places	4 places
	24 times	24 times	56 times	4 times

Source: Data obtained from the Project

<b>Indicator 1-4</b>	<b>New Ramtar maintenance office is constructed and emergency maintenance equipment is provided.</b>
----------------------	--

The establishment of new Ramtar maintenance office as a main site office was proposed by the SRMU and the Japanese experts in September 2012 to strengthen the road maintenance system after full opening of the Sindhuli Road. The construction of Ramtar started in October 2014 and finally completed in May 2015 although it was delayed five months than originally planned. The installation of equipment for the office was also delayed three to four months because the DOR was too busy for undertaking emergency maintenance works after the earthquake occurred in April 2015. At the time of the Terminal Evaluation, the office equipment such as furniture and generators has been already installed in the Ramtar office. The Table 3 presents the emergency maintenance equipment to be provided by JICA. It was being procured by JICA India Office at the time of the Terminal Evaluation. According to the Japanese experts, it may take one to two months to procure these equipment. If the emergency maintenance equipment can be handed over to the Ramtar Office and the site office at Bardibas, the Indicator 1-4 is expected to be achieved by the end of the Project.

<b>SN</b>	<b>Item</b>	<b>Main Site Office at Ramtar</b>	<b>Site Office at Bardibas</b>	<b>Total</b>
1	Wheel base multi backhoe with shovel	2	2	4
2	3 ton vibration roller	1	1	2
3	Air compressor	1		1
4	Mini Dumper	2	2	4
5	Double cab pick truck	1	1	2
6	Portable asphalt mixer	1		1
	Total	8	6	14

Source: Data obtained from the Project

## **Summary of Output 1**

All the activities under the Output 1 have made good progress. Regarding the Indicators, the Indicator 1-2 of development of ARMP and the Indicator 1-3 of implementation of specific and emergency maintenance works have been already achieved. The Indicator 1-1 of development and updating of road inventory and maintenance and disaster records will be achieved by the end of the Project. The Indicator 1-4 is expected to be achieved if the emergency maintenance equipment can be handed over to the Ramtar and Bardibas offices by the end of the Project. Therefore, the Output 1 has been on track at the time of the Terminal Evaluation, and is expected to be completely achieved by the end of the Project.

<b>Output 2:</b>	<b>The road management system of the Sindhuli Road regarding disasters, traffic accidents, etc. is established.</b>
------------------	---

<b>Indicator 2-1</b>	<b>Emergency Information System is established.</b>
----------------------	---

The Emergency Information System (EIS) has been established in the end of August 2014 and handed over to the DOR on September 1, 2014. The Project conducted the training on EIS operation twice in Dhulikhel and Bardibas, in which the DOR, the police, the local bodies in Sindhuli district and general drivers participated. The maintenance of EIS was supposed to be immediately contracted out. However, it took time for the DOR to complete the contract management procedures because such a contract for the maintenance of EIS was the first time for the DOR. The EIS developed by the Project was new initiatives in Nepal. Because the number of eligible candidates who can fulfill the selection criteria was limited, it took time for the DOR to select the appropriate contractor. The Japanese experts advised the DOR to include not only maintenance but also operation of EIS in the terms of reference for a contractor, considering that the DOR cannot operate the EIS with its own. The DOR finally signed a contract with the contractor for the operation and maintenance of EIS in July 2015. The Indicator 2-1 has been already achieved.

<b>Indicator 2-2</b>	<b>Road safety countermeasures are implemented in accordance with the Road Safety Management Plan.</b>
----------------------	--

The Table 4 shows the road safety measures proposed by the Project. The Project has developed the Road Safety Management Plan and taken the road safety countermeasures with its budget as follows: 1) installation of road information board in the three places, 2) installation of 18 curve mirrors, 3) implementation of eight-time safety campaigns, and 4) installation of 104 out of 167 road traffic signs. The DOR has also conducted intersection improvement in Bardibas, Bhakundebesi and Dhulikhel, contracted out for 16 bus lay-bys and sight distance improvement in 6 sites of the Section I and IV, and

so on with its own budget. The target value of the progress of each safety countermeasures by the end of the Project was not set because the target year of Road Safety Management Plan is up to 2018. Considering that the Project has implemented various safety measures as per this Plan, it can be said that the Indicator 2-2 has been achieved.

**Table 4: Road Safety Management Plan (2013-2016) and progress as of July 2015**

SN	Description of Works*1	Units	Section Wise									Funded by			
			Sec I		Sec II		Sec III		Sec IV		Total	GON		JICA	
			Planned Quantity	Progress	Planned Quantity	Progress	Planned Quantity	Progress	Planned Quantity	Progress		Planned Quantity	Progress	Planned Quantity	Progress
(1)	Intersection Improvement	Nos.	1	85%	-	-	-	-	2	100%	3	3	95%	-	-
(2)	Parking Place	Nos.	-	-	-	-	2	Proposed	-	-	2	2	Proposed		
(3)	Parking Area	Nos.	-	-	8	Proposed	2	Proposed	9	Proposed	19	19	Proposed		
(4)	Road information Board (RIB)	Nos.	1	100%	1	Proposed	1	Proposed	2	100%	5	2	Proposed	3	100%
5	Junction Improvement with Construction of 2 no. Island	Nos.	-	-	2	Proposed	-	-	-	-	2	2	Proposed		
6	Road side Delineator	Nos.	1500	35%	-		-		500	Proposed	2000	2000	26%		
7	Bus Lay Bys	Nos.	7	85%	6	30%	5	Proposed	32	19%	50	50	47%		
8	Footpath Construction	m	2410	21%	2060	9.70%	-	-	2865	35%	7335	7335	23%		
(9)	Sight Distance Improvement	Nos.	6	33%	-	-	-	-	48	15%	54	54	16%		
(10)	Curve Mirror*2	Nos.	-		-	-	-	-	18	Installation in Process	18			18	100%
11	Road Widening	Nos.	2	Proposed	-	-	-	-		Recommend to Widen	2	2	Proposed		
12	Access Improvement	Nos.	1	Proposed	-	-	-	-	-	-	1	1	Proposed		

13	Safety Barrier	Nos.	11	Proposed	-	-	-	-	-	-	11	11	Proposed		
14	Guard blocks	Nos.	-		25	Proposed	-	-	800	73%	825	825	44%		
15	Road Traffic Signs *3	Nos.	109	68%	40	Proposed	-	-	133	23%	282	115	Proposed	167	62%
16	Road Markings	Km	37	Proposed	30	23%	37	Proposed	30	38%	134	134	7%		
(17)	Speed Reduction (Road hump or Rumble strip)	Nos.	10	Proposed	-	-	-	-	10	Proposed	20	20	Proposed		
(18)	Road Safety Campaign	Nos.	2	100%	1	100%	2	100%	3	100%	8	1	100%	7	100%

Source: Data obtained from the Project

Note: \*1 Safety measures (1), (2), (3), (4), (9), (10), (17) and (18) were proposed and introduced newly by the Project.

\* 20 curb mirrors were procured with the support of the Project. The remaining 2 curve mirror are kept in DOR for replacement.

\*3 167 road traffic sign were procured, and 104 were already installed. The remaining 63 are in process of installation.

<b>Indicator 2-3</b>	<b>The safety patrol and the safety campaign are conducted in accordance with the Road Safety Patrol Manual.</b>
----------------------	--

The Project prepared the Road Safety Patrol Manual in September 2013. Since then, the Project has conducted the monthly-safety patrols in which the members of SRMU and the SRDPU as well as the Japanese experts confirmed the road safety and discussed the necessary measures. To raise public awareness of road safety, the Project has conducted the road safety camping eight times (See the Table 5). At each campaign, about 100 people including the local bodies in Sindhuli district, the police, students, bus drivers, taxi drivers and nearby residents gained the knowledge on traffic rules and manners, traffic accidents and road safety measures undertaken by the Project. The Indicator 2-3 has been already achieved.

<b>Table 5: Road safety awareness campaign</b>				
<b>SN</b>	<b>Venue</b>	<b>Section</b>	<b>Time</b>	<b>Budget allocated by</b>
1	Patalekheth	IV	September 2012	DOR
2	Ratmata	III	February 2013	JICA Nepal Office
3	Sindhuli Bazar	II	February 2013	JICA Nepal Office
4	Bardibas	I	February 2013	JICA Nepal Office
5	Khurkot	III	August 2014	Project
6	Nepalthok	IV	September 2014	Project
7	Bakundebesi	IV	July 2015	Project
8	Biman	I	July 2015	Project

Source: Data obtained from the Project

<b>Indicator 2-4</b>	<b>The database of the traffic accident is updated.</b>
----------------------	---

The data of traffic accidents in the Sindhuli Road was basically collected by the Traffic Police. However, some of the data and information regarding locations and causes of traffic accidents were unspecified in their records. Others were not properly recorded although the Traffic Police had a standard record format. The Project has developed a record format and asked the Police to fill out the necessary data and information. Such collected data have been accumulated in the database of traffic accidents and the section-wise road accidents spot maps developed by the Project. This database of traffic accidents will continue to be updated by the end of the Project. The Indicator 2-4 is expected to be achieved.

The Project prepared the Guideline for Installation Method of Optical Fiber Cable (OFC) in 2014 that was not included as the PDM A consultant company hired by the Asian Development Bank-funded OFC Project did not follow the proposed installation methods of OFC, which might have an adverse effect on the Sindhuli Road. Accordingly, the Japanese expert has facilitated the DOR and the OFC Project to agree to conduct the installation work in accordance with the above guideline to minimize



damages to the Sindhuli Road. Based on the above guideline, the Project has also drafted A Guideline for Installation of Public Utilities on Mountainous Roads at the time of the Terminal Evaluation.

### **Summary of Output 2**

The activities of the Output 2 have been undertaken as planned. The Indicator 2-1 of development of EIS and the Indicator 2-3 of safety patrol and safety campaign have been already achieved. The Indicator 2-4 of updating of traffic accident database is expected to be achieved by the end of the Project. The Indicator 2-2 of implementation of traffic safety measures can be said to be achieved because the Project has vigorously carried out various traffic safety measures. Thus, the Output 2 is expected to be achieved by the end of the Project.

<b>Output 3:</b>	<b>The coordination between the DOR and the DWIDP as well as the knowledge and skills of the counterparts on countermeasure works for disasters are improved.</b>
------------------	---

<b>Indicator 3-1</b>	<b>Project related issues including road disaster countermeasures are presented by individual counterpart at the workshops and the PCC meetings.</b>
----------------------	--

The C/Ps of the DOR, the DWIDP, and the RBN have taken part in the Project activities as the members of the SRMU and the SRDPU. The Project has encouraged them to make a presentation on the related activities of the Project on various occasions to improve their capacities. As shown in the Table 6, five C/Ps made a presentation on the progress of Project activities and the present issues in the Project Coordinating Committee (PCC) meetings. Nine participants of training in Japan were divided into three groups and made a presentation on their action plans respectively in August 2013. At the workshop of Pilot Projects, six C/Ps reported the progress and the problems of each Pilot Project. The C/P of DWIDP had a chance to participate in International Symposium in Indonesia in September 2013 and made a presentation on early warning system for landslide risk reduction. Likewise, the C/Ps of DOR and DWIDP were supposed to participate in the International Symposium in India for their presentation. However, the influence of massive earthquake occurred in April 2015 prevented them from attending it. Considering the above, the Indicator 3-1 can be said to be achieved.

<b>Table 6: Presentations made by the C/Ps</b>		
<b>S.N.</b>	<b>Title of presentation, venue and date</b>	<b>Name of Presenter</b>
1	1. Proposed Annual Road Maintenance Plan (ARMP) for the year (2012/2013) 2. Proposed Cooperative Framework with DWIDP at the 1 <sup>st</sup> PCC in 20 <sup>th</sup> March 2012	1. Mr. Bharat Kaji Deoju (DOR) 2. Mr. Shanmukhesh Chandra Amatya (DWIDP)
2	Proposed New Maintenance System of Sindhuli Road and Establish of New Ramtar Site Office at the 2 <sup>nd</sup> PCC in 28 <sup>th</sup> September 2012	Mr. Bharat Kaji Deoju / Mr. Govinda Prasad Wagle (DOR)

3	Result of safety campaign which was done by SRMU at sections I, II and III of the Sindhuli Road in 24 <sup>th</sup> to 26 <sup>th</sup> February 2013 at the 3 <sup>rd</sup> PCC in 4 <sup>th</sup> March 2013	Mr. Karna S. Katari (DOR)
4	“Result of training in Japan-Action Plan” Group A: Road Maintenance and Management System Group B: Action Plan for Roadside Station in Sindhuli Road Group C: Role of River and River Management presented at the training in Japan on 9 <sup>th</sup> August 2013	Group A: Mr. Devendra Karki (DOR) Mr. Ramesh Nath Bastola (RBN), Mr. Ram Chandra Raut (DOR), and Mr. Pashupati Gyawali (DOR) Group B: Mr. Bharat kaji Deoju (DOR), Mr. Govinda Prasad Wagle (DOR) and Mr. Rajendra Man Byanjankar (DOR) Group C: Mr. Shanmukhesh Chandra Amatya (DWIDP) and Mr. Bassi Gauri Shanker (DWIDP)
5	“Early Warning System as a Preventive Measure for Landslide Risk Reduction” at the International Symposium in Indonesia in September 2013	Mr. Shanmukhesh Chandra Amatya (DWIDP)
6	1. Result of technical visit to Japan 2. Proposed safety plan of Sindhuli Road and Progress presented at the 4 <sup>th</sup> PCC in 23 <sup>th</sup> September 2013	1. Mr. Bharat Kaji Deoju (DOR) 2. Mr. Karna S. Katari (DOR)
7	1 <sup>st</sup> workshop of pilot project on 19 <sup>th</sup> December 2013 1. Outline of Pilot Project 2. Countermeasure Design at JI site 3. Landslide Countermeasure	1. Mr. Govinda Prasad Wagle (DOR) 2. Mr. Sudip Karki (DOR) 3. Mr. Shanmukhesh Chandra Amatya (DWIDP)
8	2 <sup>nd</sup> workshop of pilot project on 17 <sup>th</sup> February, 2014 1. Pilot Projects in Section IV 2. Countermeasure in Priority Project 3. Outlines of EIS (Emergency Information System) 4. Landslide Countermeasure Construction in Section II	1. Mr. Ram Kumar Shrestha (DOR) 2. Mr. Krishna Pandey (DWIDP) 3. Ms. Shila Shrestha (DOR) 4. Mr. Govinda Prasad Wagle (DOR)
9	1. Progress of pilot and priority project supervised by DWIDP and priority project allocated to DWIDP 2. Progress of safety improvement measures presented at the 5 <sup>th</sup> PCC in 30 <sup>th</sup> May 2014	1. Mr. Shanmukhesh Amatya (DWIDP) 2. Ms. Shila Shrestha (DOR)
10	3 <sup>rd</sup> workshop of pilot project on 29 <sup>th</sup> August, 2014 1. Report for Jure landslide which damming Sun Koshi, and requirement of disaster management by climate change adaptation in Sindhuli road area 2. Emergency Information System (EIS), Introduction of EIS in Banepa-Sindhuli - Bardibas Road 3. Countermeasures of landslide and river erosion measures of DWIDP’s priority projects 4. Landslide Countermeasure (Japanese grant) Construction in Section II	1. Mr. Shanmukhesh Amatya (DWIDP)  2. Mr. Govinda Prasad Wagle (DOR)  3. Mr. Krishna Pandey (DWIDP)  4. Ms. Shila Shrestha (DOR)
11	Tackling the Challenge of Slope Stabilization and Landslide Prevention, An International Symposium 27 <sup>th</sup> to 29 <sup>th</sup> April 2015 Uttarakhand State Disaster Management Authority (USDMA), Government of Uttarakhand Japan International Cooperation Agency (JICA) World Bank (WB) 1. Emergency Information System (EIS), Introduction of EIS in Banepa-Sindhuli - Bardibas Road 2. Landslide countermeasure of the Sindhuli Road  The presentations were entry and prepared. Presentations were not conducted due to the earthquake just before the events.	1. Ms. Shila Shrestha (DOR)  2. Mr. Krishna Pandey (DWIDP)

Source: Data obtained from the Project

<b>Indicator 3-2</b>	<b>The sustainable cooperative framework between the DOR and the DWIDP is established.</b>
----------------------	--

The cooperative framework and the division of responsibilities between the DOR and the DWIDP have been established by the Project through discussions among the stakeholders. They were finally agreed and signed in the Minutes of Meeting (M/M) as follows: in hazard areas within 25 m from the center of the road carriage way, the DOR shall manage the disaster prevention work; in hazard areas or extended hazard sources outside of 25 m from the center of the road carriage way, and/or river erosion area, the DWIDP shall manage the disaster prevention work. They have worked together in accordance with such a framework. The Indicator 3-2 has been already achieved.

<b>Indicator 3-3</b>	<b>The number of countermeasures conducted by the Pilot Projects and the Priority Projects increases from 0 place at the start to 23 places at the end.</b>
----------------------	---

The members of the SRMU and the SRDPU and the Japanese experts conducted a site visit and risk assessment based on the hazard map developed by the Project. Accordingly, the Project selected six sites for the Pilot Projects and contracted out one private contractor with the mount of NRs 97.54 million. The construction was implemented from September 2013 to August 2014 (See the Table 7). During the implementation, some of the local residents of the opposite side of the river disturbed the river erosion protection work demanding construction of the irrigation canal. It was settle down one month later after the members of the SRMU and the SRDPU visited the site several times to convince these local residents to stop disturbing the work.

<b>Table 7: Progress of the Pilot Projects (as of 31 August 2014)</b>							
	Sec.	Station	Hazard Type	Risk Level	Responsible Agency	Progress	
J1	II	Sta. 27+280	Soil/Debris Fall	Moderate	DOR	100%	Completed in August 2014
J2	II	Sta. 9+700	Sinking/Retaining Wall Deformation	Moderate	DOR	100%	Completed in May 2014
J3	IV	Sta. 7+800	Rock fall	Moderate	DOR	100%	Completed in February 2014
J4	IV	Sta. 19+600	Debris flow	Moderate	DWIDP	100%	Completed in May 2014
J5	IV	Sta. 16+900	River Erosion	Moderate	DWIDP	100%	Completed in March 2014
J6	I	Sta. 29+300	Slide	Moderate	DWIDP	100%	Completed in April 2014

Source: Data obtained from the Project

The Priority Projects have been undertaken by the DOR and the DWIDP with the budget of GON. At the time of the Terminal Evaluation, 15 out of 17 Priority Projects were completed, and the remaining

two Priority Projects (N 20 and N 21) are expected to be completed in November 2015 (See the Table 8).

Table 8: Progress of the Priority Projects (as of 14August 2015)								
S.N.		Sec.	Station	Hazard Type	Risk Level	Responsible Agency	Progress	
1	N1	II	Sta. 17+400	Soil/Debris Fall	High	DOR	100%	Completed in May 2014
2	N2	II	Sta. 24+020	Sinking/Retaining wall Deformation	High	DOR	100%	Completed in August 2014
3	N3	II	Sta.10+020	Soil/Debris Fall	Moderate	DOR	100%	Completed in June 2014
4	N4	II	Sta. 21+600	Soil/Debris Fall	Moderate	DOR	100%	Completed in November 2014
	N5*	II	Sta. 29+500 to 30+000	Soil/Debris Fall	Moderate	DOR	-	Maintenance work only
5	N6	IV	Sta. 7+850	Soil/Debris Fall	Moderate	DOR	100%	Completed in July 2013
	N7*	II	Sta. 14+100	Sinking/Retaining wall Deformation	Moderate	DOR	-	Maintenance work only
	N8*	II	Sta. 34+800	Sinking/Retaining wall Deformation	Moderate	DOR	-	Maintenance work only
6	N9	IV	Sta. 5+500	River Erosion	Moderate	DWIDP	100%	Completed in August 2014
7	N10	IV	Sta. 12+500	River Erosion	Moderate	DWIDP	100%	Completed in August 2015
8	N11	I	Sta. 8+300 (Kara Bridge)	River Erosion	Moderate	DOR	100%	Completed in September 2013
9	N12	I	Sta. 29+900	Slide	Moderate	DOR	100%	Completed in November 2014
10	N13	I	Sta. 30+600	Slide	Moderate	DOR	100%	Completed in June 2013
11	N14	I	Sta. 31+900	Slide	Moderate	DOR	100%	Completed in Feb. 2014
	N15**	II	Sta. 10+100	Sinking/Retaining wall Deformation	Slight	DOR	-	It will be conducted as a pilot project.
12	N16	II	Sta. 11+700	Sinking/Retaining wall Deformation	Slight	DOR	100%	Completed in May 2014
13	N17	IV	Sta. 10+100	Debris flow	Slight	DOR	100%	Completed in August 2013
						DWIDP	100%	Completed in January 2015
14	N18	I	Sta. 31+120	Debris flow	Moderate	DOR	100%	Completed in February 2014

15	N19	I	Sta.29+350-32+800	River Erosion	Moderate	DWIDP	100%	Completed in August 2015
16	N20	I	Sta.32+800	Road foundation collapse	Moderate	DOR	5%	Preparation of materials only
17	N21	I	Sta.29+350	Road foundation collapse	Moderate	DOR	5%	Preparation of materials only

Source: Data obtained from the Project

Note: \*N5, N7 and N8 were not included in the Pilot Projects. They were or will be repaired by the DOR as the normal maintenance work.

N15\*\* will be conducted by pilot project additional, since it was seriously damaged by the earthquake in April/May 2015.

After the massive earthquake occurred in April 2015, 12 out of 21 sites that were seriously damaged have been selected as additional Pilot Projects and contracted out. As presented in the Table 9, four additional Pilot Projects have been already completed at the time of the Terminal Evaluation. Eight other Pilot Projects are expected to be completed by the end of the Project. The Project has completed six Pilot Projects, 15 Priority Projects and four additional Pilot Projects, which exceeded 23 places of target value of the Indicator 3-3. Thus, the Indicator 3-3 has been already achieved.

**Table 9: Progress of the Pilot Projects 2 (as of 31 July 2015)**

	Sec.	Station	Hazard Type	Risk Level	Responsible Agency	Progress (financial)	
E1	II	Sta. 9+200	Road foundation collapse	High	DOR	29%	
E2	II	Sta. 10+100	Road foundation collapse	High	DOR	35%	
E3	II	Sta. 10+800	Road foundation collapse	High	DOR	29%	
E4	II	Sta. 12+300	Road foundation collapse	High	DOR	100%	Completed in July 2015
E5	II	Sta. 33+400	Road foundation collapse	High	DOR	70%	
E6	II	Sta. 33+800	Road foundation collapse	High	DOR	42%	
E7	II	Sta. 34+200	Road foundation collapse	High	DOR	100%	Completed in July 2015
E8	III	Sta. 15+520	Road foundation collapse	High	DOR	100%	Completed in July 2015
E9	III	Sta. 27+650	Road foundation collapse	High	DOR	100%	Completed in July 2015
E10	III	Sta. 30+680	Road foundation collapse	High	DOR	57%	
E11	IV	Sta. 22+600	Rock fall	High	DOR	1%	
E12	IV	Sta. 40+900	Landslide	High	DOR	99%	

Source: Data obtained from the Project

### **Summary of Output 3**

Most of the activities of the Output 3 have been carried out as planned. The Indicator 3-1 of presentation made by C/Ps has been already achieved. The Indicator 3-2 of the cooperative framework between the DOR and the DWIDP has been also achieved. Regarding the Indicator 3-3, the countermeasures have been undertaken in 23 places as planned, and additionally in 12 places after the earthquake. At the time of the Terminal Evaluation, 25 out of 35 countermeasures have been completed, which exceeded 23 places, i.e. the target value of the Indicator 3-3. Therefore, the Output 3 has been already achieved.

### **2.3 Project Purpose**

<b>Project Purpose:</b>	<b>Routine, recurrent, periodic, and emergency maintenances along the Sindhuli Road come to be promoted by the Department of Road (DOR) and Department of Water Induced Disaster Prevention (DWIDP).</b>
-------------------------	--

The current status of each verifiable indicator is presented below.

<b>Indicator 1</b>	<b>A road closure caused by disasters does not continue for more than one day.</b>
--------------------	--

The Table 10 shows the duration of road closures due to natural disasters of rainfall in the Sindhuli Road. The Indicator 1 was set based on the assumption that one of the main reasons for road closure is natural disasters of rainfall including debris flow, although it was not clearly stated in the Indicator. That is why the road closures caused by the earthquake happened in April 2015 were not included in the Table 10.

<b>Table 10: Road closure due to natural disaster of rainfall</b>						Unit: Hour
Sec.	2011	2012	2013	2014	2015 (Jan.-June)	Remarks
I	21	27	31	30.5	3	The longest closure in Section I was 8.5 hours on Aug. 18, 2014.
II	55	3	0	0	0	The longest closure in Section II was 3 hours in June and July 2012.
III				12	7	The longest closure in Section III was 5 hours on July 5, 2015.
IV	27	39	46.5	79	6	The longest closure in Section IV was 10 hours on Aug 2, 2014.
Total (hours)	103	69	77.5	121.5	16	
Frequency of road closure	12	24	24	56	4	
Average road closure time (hour)	8.6	2.9	3.2	2.2	4.0	
		2.6				

Source: Data obtained from the Project

Note: Seventy two (72) hours of road closure happened in the Section II and III due to the earthquake, but not included in this table.

The average road closure time was 8.6 hours in 2011 before the commencement of the Project. The road closures continued 24 hours twice in the Section II and once in the Section IV in 2011. As presented in the Table 10, the average road closure time has notably decreased. The various intervention of the Project including the countermeasures against disasters in the Pilot Projects and Priority Projects and specific maintenance works undertaken by the DOR has been likely to contribute to reducing the average road closure time. During the Project period from 2012 to 2015, the longest road closure was 10 hours in the Section IV, which is less than one day. The average road closure time between 2012 and 2014 was 2.6. Thus, the Indicator 1 has been achieved.

It should be noted that the total road closure time has highly increased in the Section IV. The road closure continued for almost one day in Kaldhunga because of debris flow in 2012 before the commencement of the Project. In 2014, the road was also blocked for 10 hours near the Daunne River due to heavy rains in 2014. The road closure has frequently occurred at the causeways in the Section IV. According to the Japanese experts, two causeways were seriously damaged because of heavy rains in 2014. The DOR has requested JICA to provide the support for restoration of these causeways with the Japanese grant aid.

<b>Indicator 2</b>	<b>Surface distress index (SDI) on Sindhuli road keeps in less 2 point (in good condition) through a whole year.</b>
--------------------	--

Surface Distress Index (SDI) is an important visual indicator of pavement deterioration and includes all types of defects affecting the integrity of the surface.<sup>6</sup> The survey of SDI has been conducted annually by the Highway Management Information System (HMIS) Unit, the Planning Branch of DOR. The Table 11 illustrates the year-wise SDI from 2011/2012 to 2014/2015. The SDI values of all the sections in 2013 were less 2.0 point and assessed as “good”. The Indicator 2 has been already achieved at the time of the Mid-Term Review Study held in January, 2014. Regarding the SDI values in 2015, it was 1.79 in the Section II, which was less than 2.0 point. On the other hand, the SDI values of the Section I and the Section IV were 2.49 and 2.34 respectively. They did not reach the target value of the Indicator 2 although they were assessed as “fair”. In the Section I, the pavement has been deteriorated particularly by heavy rains in August 2014. Also, the pavement in the Section IV has been drastically deteriorated because of the rapid increase of heavy traffic and the exceeding of pavement life of Double Bituminous Surface Treatment (DBST). According to the Project, these factors might influence the deterioration of SDI values in the Section I and the Section IV in 2015. In these sections,

<sup>6</sup> See details in “Discussion Paper Road Pavement Management” (MRCU, 1995).

the Project and the DOR have taken various countermeasures. For example, in the case of the Section I, the Project conducted the three Priority Projects (N19, N20, and N21) from September 2014 after the road shoulder collapsed in August 2014. The DOR has carried out periodic, recurrent and specific maintenance works seven times since May 2011 in the Section IV. According to the C/Ps and the Japanese experts, many potholes have been detected in this section in spite of these maintenance works. The effective countermeasures need to be considered to improve the SDI values of the Section IV.

Considering the above as whole, it can be said that the Indicator 2 has been almost achieved.

**Table 11: Year-wise Surface Distress Index (SDI)**

Survey Year	Link code	H0605	H0608	H0609	H0610
	Link name	Bardibas-Sindhuli Bazar	Sindhuli-Khurkot	Khurkot-Nepalthok	Barkhe Khola-Dhulikhel
	Length (km)	35	36	37	50
	Section	Sec. I	Sec. II	Sec. III*	Sec. IV
2011-2012	Pavement SDI (Survey: Nov 21,2011)	1.12	1.04	Null	2.47
2012-2013	Pavement SDI (Survey: Jan 3,2013)	1.06	1.51	1.00	1.39
2013-2014	Pavement SDI (Not done in 2014)	Null	Null	Null	Null
2014-2015	Pavement SDI (Survey: Jan 8,2015)	2.49	1.79	Null	2.34

Source: HMIS Unit, Planning and Design Branch, DOR (Website)

Note: \*The SDI data was not available except for 2012-2013 because it was under construction. In 2012-2013, 14 km of the completed section was studied to assess SDI.

The averaged values of SDI are as follows: SDI 0-1.7 is ranked as “good”. SDI 1.8-3.0 is ranked as “fair”. SDI 3.1-5.0 is ranked as “poor”.

**Summary of Project Purpose**

The average road closure time in the Sindhuli Road from 2012 to 2014 was 2.6 hours. It was confirmed that the longest road closure was 10 hours in the Section IV on August 2, 2014, which reached the target value of the Indicator 1. Thus, the Indicator 1 has been already achieved. Regarding the Indicator 2 of SDI values, the SDI values of all sections has been less than 2 point in 2012/2013. At the time of the Mid-Term Review Study held in January 2014, it has been already achieved. However, the SDI values of the Section I and the Section IV were 2.49 and 2.34 respectively and were assessed as fair in 2014/2015 while that of the Section II was 1.79, which reached the target value of the Indicator 2. It can be said that the Indicator 2 has been almost achieved as a whole, although the effective countermeasures need to be continuously taken to improve the SDI values of the Sindhuli



Road. Considering the above, the Project Purpose has been mostly achieved.

## 2.4 Overall Goal

<b>Overall Goal:</b>	<b>Safe and smooth road traffic along the Sindhuli Road is secured.</b>
----------------------	---

<b>Indicator 1</b>	<b>Fatality ratio per vehicle-km for the year of 2011 in the handed over sections reduces by 35% by 2018.</b>
--------------------	---

The total average of fatality rate of the Sindhuli Road in 2011 is 5.5 that is the benchmark of the Indicator 1. Its target value was set as 3.6. As illustrated in the Table 12, the yearly fatality rate has been improved compared to that of the year 2011 before the commencement of the Project. This might be a result of the safety improvement measures undertaken by the Project. The Indicator 1 was once achieved in 2013 because the total average of fatality rate in 2013 was 2.9. However, that of 2012 and 2014 was 5.1 and 4.8 respectively. Considering the above as a whole, the Indicator 1 has been partially achieved.

Section	2011*			2012**			2013**			2014**			2015**		
	Fatality	Traffic volume	Length (km)	Fatality	Traffic volume	Length (km)	Fatality	Traffic volume	Length (km)	Fatality	Traffic volume	Length (km)	Fatality	Traffic volume	Length (km)
	Fatality Rate***			Fatality Rate			Fatality Rate			Fatality Rate			Fatality Rate		
I	4	1902	37	7	1341	37	4	1992	37	8	1987	37	2	3889	37
	5.7			14.1			5.4			10.9			1.4		
II	5	1,902	36	3	2,499	36	0	2,940	36	6	2,892	36	0	3,801	36
	7.3			3.3			0.0			5.8			0.0		
III													1	1,489	37
													1.8		
IV	3	1,487	50	4	2,824	50	6	3,357	50	2	3,240	50	1	5,333	50
	4.0			2.8			3.6			1.2			0.4		
Total Average	12	1,764	123	14	2,221	123	10	2,763	123	16	2,706	123	4	3,628	160
	5.5			5.1			2.9			4.8			0.7		

Source: [Traffic Volume] Progress Report No.4 P3-39 published by SRMU, [Fatality] Police Station

Note: \* The traffic volume is based on traffic survey (24 hours) result conducted by HMIS Unit of DOR and excluding tractor, three wheeler, power tiller and non-motored vehicles.

\*\* The traffic volume is based on traffic survey conducted by SRMU and only included 1) Car/Jeep/Van, 2) Bus, 3) Light Truck, 4) Heavy Truck, and 5) Motorcycle in 16hrs weekday survey.

\*\*\*Fatality rate = [Fatality / (Traffic Volume x Length)] x 100,000

The total average of fatality rate varies from one section to another. In the Section IV, the total average of fatality rate has highly decreased from 4.0 to 1.2 for the last four years. In other words, it has decreased by 70% by 2014. On the other hand, the fatality rate in the Section I has fluctuated from

2011 to 2014. As indicated in the Table 12, it has notably increased from 5.4 in 2013 to 10.9 in 2014. The fatal traffic accident due to excessive speed occurred in August 2015 just before the Terminal Evaluation, in which eight passengers of the bus were killed. According to the Japanese experts, such fatal traffic accidents caused by excessive speed has increased in the straight path of the Section I in spite of the clear visibility.

The number of traffic fatal accidents from 2011 to July of 2015 is 42, and the number of fatality reaches 56. The causes of the accidents were reported as follows: 1) excessive speed (22 cases), 2) unknown (15 cases), 3) careless driving (3 cases) and 4) overloaded (2 cases), no driving license (2 cases), drunken driving (2 cases) and vehicle problem (2 cases).

<b>Indicator 2</b>	<b>Road users' satisfaction to road maintenance and safety management and performance in the handed over sections reaches 4.0 points in average.</b>
--------------------	--

The road users' satisfaction to road maintenance and safety management was studied by the Project in the Traffic Surveys conducted every year. The drivers of different types of vehicles were asked to rate their satisfaction level from 1 to 5 regarding the following five items: 1) road roughness, 2) blockage, 3) passing places, 4) sight distance, and 5) safety measures. The survey results were presented in the Table 13. In 2013 and 2014, the average rate of road users' satisfaction was 4.1 and 4.2, which exceeded the target value of 4.0 of the Indicator 2. Thus, the Indicator 2 has been achieved by 2014. However, the average rate of road users' satisfaction has decreased to 3.4 in 2015, which is below the target value of the Indicator 2. The average satisfaction rate in the Section III in 2015 was 3.6 even though the construction of the Section III was just completed in March 2015. The satisfaction rate for the road roughness in this section was assessed as 4.0. Concerning the sight distance, the satisfaction rate of the Section I and the Section III was 2.8 in 2015 regardless of clear visibility in both sections. The satisfaction rate for the sight distance in the Section II and the Section IV has remarkably decreased from 2014 to 2015 although the liner shape of both sections was not changed. This result should be carefully reviewed and further analyzed by the C/Ps and the Japanese experts. As a whole, it can be said that the Indicator 2 has been partially achieved at the time of the Terminal Evaluation.

Table 13: Result of road users' satisfaction																					
Year	Section I Bardibas - Sindhuli Madi					Section II Sindhuli Madi – Khurkot					Section III Khurkot - Nepalthok					Section IV Nepalthok - Dhulikhel					Yearly Average
	Road Roughness	Blockage	Passing Places	Sight Distance	Safety Measures	Road Roughness	Blockage	Passing Places	Sight Distance	Safety Measures	Road Roughness	Blockage	Passing Places	Sight Distance	Safety Measures	Road Roughness	Blockage	Passing Places	Sight Distance	Safety Measures	
2012	3.0	3.3	3.0	3.3	1.8	3.3	4.0	3.0	3.3	4.0						3.3	4.0	3.3	3.3	3.0	3.3
	2.9					3.5										3.4					
2013	3.5	3.5	3.5	4.3	3.5	4.5	4.5	3.5	4.3	5.0						4.0	3.8	4.5	4.5	4.0	4.1
	3.7					4.4										4.2					
2014	4.3	4.0	4.0	4.0	4.0	4.5	4.5	4.0	4.3	5.0						4.0	4.0	4.3	4.3	4.0	4.2
	4.1					4.5										4.1					
2015	3.8	4.5	2.8	2.8	2.8	3.8	4.5	2.8	2.0	3.0	4.0	4.5	3.0	2.8	3.8	3.8	4.5	3.0	2.8	2.8	3.4
	3.3					3.2					3.6					3.4					

Source: Data obtained from the Project

Note: The Lowest level of satisfaction was 1.0 while the highest one was 5.0.

### **Summary of Overall Goal**

The Indicator 1 of the fatality rate and the Indicator 2 of road users' satisfaction rate have been partially achieved. Thus, the Overall Goal has been partially achieved at the time of the Terminal Evaluation Study. It is imperative for the DOR to keep implementing road safety measures, conducting countermeasures against disasters and further strengthening the operation and maintenance system to ensure safe and smooth road traffic in the Sindhuli Road. On the other hand, the external factors that cannot be controlled by the Project may influence the achievement of the Overall Goal. They include road users' manners and awareness of traffic rules, and the police's patrols and control over traffic violation. The current indicators of the Overall Goal, which were modified based on the intensive discussions between the C/Ps and the experts at the time of the Mid-Term Review, cannot directly measure the sustainability of the Project's effects. Some additional indicators to assess directly the sustainability of the Project need to be considered and included in the PDM.

### **3. Implementation Process of the Project**

Overall, the Project has been implemented as planned.

#### Factors that contributed to the implementation process

- As most of the C/P of the DOR have had the work experiences in the Project for the construction of Sindhuli Road, they have taken part in the Project with a sense of ownership and responsibility.
- The DOR and the DWIDP have performed the agreed roles in the M/M, and have closely coordinated and worked together.
- Most of the Japanese experts, i.e., 11 out of 16 experts, have the extensive work experiences in Nepal.
- The Chief Advisor who has worked frequently with the DOR has played a leading role in building a relationship of trust with the DOR and the DWIDP and managing the Project.
- The Expert on Road Administration who worked as the Project Manager in the Project for Construction of the Sindhuli Road for sixteen years has played a major role in coordinating work with the DOR and the DWIDP.
- The communication and team work have been good between the Japanese experts and the C/Ps.
- Monitoring of the Project through PCC meetings and monthly meetings at the SRMU has been in place and worked well.

#### Factors that prevented the smooth implementation to some extent

- The local people living in the vicinity of the Sindhuli Road have often demanded various countermeasures for disasters to protect their property and develop their irrigation facilities, and in some cases, they have demanded something unreasonable and disturbed the implementation of the Pilot and Priority Projects. Such a disturbance frequently happened in the first half of the Project period.
- The C/Ps of the DOR were frequently transferred in the latter-half period of the Project. That prevented the effective technical transfer from the Japanese experts to the C/Ps of the DOR. It also affected the efficiency of management of the DOR's activities such as construction of the Ramtar Office and contracting out of EIS.
- The EIS developed by the Project was new initiatives in Nepal. It took time for the DOR to complete the contract management procedures because such a contract for the maintenance of EIS was the first time for the DOR. Furthermore, it took time for the DOR to select the appropriate contractor because the number of eligible candidates who can fulfill the selection criteria was limited. The EIS was finally contracted out in July 2015 after about 10 months from the completion of development of EIS.

### The organizational framework of project implementation

- The PCC comprising the DOR, the DWIDP, the RBN, the Japanese experts, JICA Nepal Office and the Japanese Embassy was established in accordance with the R/D.
- Both the SRMU and the SRDPU were established in the DOR and the DWIDP respectively at the request of the Project. The respective C/Ps have been assigned in these organizations.

### Monitoring

- The progress of the Project was reported and discussed between the Nepalese C/Ps and the Japanese experts at the PCC meetings and the monthly meetings at the SRMU. The PCC meeting has been conducted bi-annually to share the progress of the Project, discuss the major concerns raised by the stakeholders and approve some important issues for the Project such as revision of the PDM and the procedures of the Pilot Project. The decision of the PCC meetings was signed in the M/M, which strongly required the stakeholders of the Project to make a commitment to take a concrete action. At the monthly meetings, the C/Ps and the Japanese experts confirmed the progress of the Project using the progress formats, discussed the concerns and countermeasures, and shared the knowledge and experiences.

### Communication among Project stakeholders

- The Japanese experts and the C/Ps have closely communicated with each other through the monthly meetings and daily works and undertaken various activities.
- The cooperative framework and the demarcation policy between the DOR and the DWIDP have been established by the Project. In accordance with such a framework and policy, they have gradually worked together and participated in the monthly meetings, various workshops, on-the-job training, training in Japan and joint monitoring of the Pilot Projects and the Priority Projects.
- The Expert on Road Administration has played a major role in coordinating with the C/Ps and other stakeholders.
- The Japanese experts have regularly reported on the progress of the Project activities to JICA headquarters and JICA Nepal Office.

### Technical transfer and ownership of implementing organizations

- The overall capacity of the C/Ps has been improved through the technical transfer from the Japanese experts, on-the-job training on sites and at the workshops, and training in Japan. According to the C/Ps, they have gained the technical knowledge of mitigation methods of road disasters and road safety management, and the know-how of risk assessment, planning and design, and cost estimation for countermeasures for natural disasters.
- The training in Japan matched the needs of C/Ps and was directly linked with the activities of the

Project. The C/Ps noted that they particularly learned the traffic management and information system, sabo technology, and roadside station called “Michino-eki”. Some of the C/Ps pointed out that some of the C/Ps were not selected to participate in the training in Japan. Instead, the person who are not C/P had a chance to attend it. The clear selection criteria should have been set. Some of the Japanese Experts also noted that some selection criteria that encouraged the young C/Ps to be selected should have been set.

- A few C/Ps indicated that they were too busy with their respective work to take part in the Project activities actively and gain the adequate knowledge and skills from the Project.
- Because some C/Ps of the DOR and the DWIDP had worked before in the Project for the construction of Sindhuli Road or in other technical cooperation projects supported by JICA, they have actively taken part in the Project activities with a sense of ownership. According to the Japanese experts, the C/Ps have gradually increased the sense of ownership and responsibility in the stage of implementation and monitoring of the Pilot Projects and the Priority Projects. They have prepared and made a presentation of these activities in the workshops.

## 4. Results of Evaluation with Five Evaluation Criteria

### 4.1 Relevance

It can be assessed that the Project has a **high degree of relevance** for technical cooperation. Results are summarized below:

#### Consistency of the policies of the GON and the GOJ

- The Project is consistent with the Three Year Interim Plan (2010/11–2012/13) and the Thirteenth Plan (2013/14–2015/16). These plans aim for improvement of safety and reliable road transportation. It is also consistent with the Priority Investment Plan (2007–2016) that emphasizes the need for routine, recurrent, periodic and emergency maintenance works.
- According to Japan's Country Assistance Policy for Nepal (2012), building social infrastructure and institutions for balanced and sustainable economic growth is one of the three priority areas for assistance. This policy highlights the need for assistance for the building of social infrastructure and institutions related to transportation, with due attention to the environment and disaster prevention. In the JICA Country Analytical Work (2013), the transport and infrastructure development program is one of JICA's cooperation programs in Nepal. The analysis emphasizes the need for assistance for improvement of living standards through improvement of the road network and safety traffic as well as vitalization of social economic activities on corridors. Thus, the Project is consistent with these Japanese aid policies. Japan has consistently supported the construction of the Sindhuli Road with its grant aid from 1996 to 2015. The Project has been fully utilizing various technologies and experiences of countermeasures for disasters employed in Japan, and has been consistent with the past assistance in this field.

#### Necessity of the Project

- The 160-km-long Sindhuli Road has been affected by sediment-related disasters in some of its sections every year. The DOR has urgently needed to ensure the traffic safety in the Sindhuli Road throughout the year. The Project has addressed such needs by strengthening the operation and maintenance system, developing road safety management, and improving the capacities of the DOR regarding countermeasures works for disasters. The cooperation between the DWIDP and the DOR for taking countermeasures against disasters is essential to maintain sustainable and safe road traffic conditions, but has not taken place effectively because of the GON's bureaucratic sectionalism. In this regard, it is the first project to address the needs for improvement of the collaboration between the DWIDP and the DOR. The Sindhuli Road links the Terai Plain, the major agricultural area in Nepal, and Kathmandu, the capital city. The Sindhuli Road that fully opened in March 2015 has been recognized as one of the key arterial roads because it has contributed to improvement of road access and traffic, and transportation of agriculture products and basic goods from the Terai and India. In this regard, the safety and smooth traffic road is the

needs of road users. The Project has met such needs.

#### Appropriateness of strategies and approaches of the Project

- The approaches adopted by the Project such as planning, designing, and implementing the Pilot Projects can be assessed as valid for enhancing the C/Ps' capacity of countermeasures for disasters. The inclusion of the Priority Projects that were to be undertaken by the DOR and the DWIDP with the budget of the GON within the scope of the Project can be assessed as appropriate for enhancing a sense of ownership of the C/Ps and ensuring the sustainability of the Project.

#### **4.2 Effectiveness**

**The effectiveness of the Project can be assessed as high** at the time of the Terminal Evaluation Study. Results are summarized below:

#### Achievement of the Project Purpose and contribution of Outputs

- The Output 3 has been already achieved and the Output 1 and the Output 2 are expected to be achieved completely by the end of the Project. Accordingly, the Project Purpose has been mostly achieved.

#### Effects generated by the Project and Factors that promoted the effectiveness of the Project

- The Project has brought about the following effects: 1) developing and updating the road inventory, the maintenance and disaster records, and road traffic information; 2) implementation of emergency maintenance works and safety traffic countermeasures based on the Operation and Maintenance Improvement Plan, the Road Safety Patrol Manual, and the Road Safety Management Plan developed by the Project; 3) formation of the ARMP based on detailed data analysis, risk assessment and cost estimation; 4) enhancing the capacity and the sense of ownership of C/Ps through participation in site study, planning and design, and implementation of the Pilot Projects and the Priority Projects; and 5) strengthening the cooperation between the DOR and the DWIDP. All of the above has helped enhance the overall effectiveness of the Project. Regarding 4), it is worth noting that the DOR and the DWIDP have allocated the GON budget to the Priority Projects respectively. Such cost sharing rarely happened in JICA's technical cooperation projects in Nepal. It was reported that the C/Ps of the DOR strived to minimize the effects of road closures in the Sindhuli Road by taking emergency maintenance and measures immediately after the big earthquake in April 2015. This was a good example that these C/Ps have the strong sense of ownership and responsibility. As for 5), it is the first project to address the needs for improvement of the cooperation between the DWIDP and the DOR to take countermeasures against disasters in accordance with the cooperative framework and the division



of responsibilities agreed between them. Such cooperation between them is expected to be helpful for other similar type of projects.

### **4.3 Efficiency**

Most of the inputs from the Nepali side and the Japanese side were provided as scheduled, except for the emergency maintenance equipment which was being procured through the JICA India Office (See 2.1 Inputs). Most of the Project activities have been completed or on the track at the time of the Terminal Evaluation. However, the following activities were undertaken behind schedule to some extent: 1) construction of the Ramtar Office, 2) contracting out of the EIS, 3) allocation of adequate budget of Priority Projects from DWIDP, and 4) implementation of some Pilot Projects and Priority Projects in the initial stage. Considering the above, it can be said that the Project has **a relatively high degree of efficiency** as a whole.

#### Factors that promoted the efficiency of the Project

- The DOR and the DWIDP bore a burden of costs for the Priority Projects and local consultants who were assigned on sites.
- Most of the Japanese experts have extensive work experiences in Nepal. Particularly, the Chief Advisor and the Expert on Road Administration have the substantial knowledge of the Sindhuli Road and abundant acquaintances from the DOR.
- The progress of the Project activities has been appropriately monitored at the monthly meetings of the SRMU in which the C/Ps of the DOR, the DWIDP and the RBN as well as the Japanese experts participated.

#### Factors that prevented the efficiency of the Project

- The local people living in the vicinity of the Sindhuli Road have often demanded various countermeasures for disasters to protect their property, and in some cases, they have demanded something unreasonable and disturbed the implementation of the Pilot Projects and the Priority Projects.
- The personnel transfer including the Deputy Project Manager frequently occurred in the DOR in the latter-half period of the Project. This has partially affected the efficiency of management of the DOR's activities such as construction of the Ramtar Office and contracting out of EIS.
- The EIS developed by the Project was new initiatives in Nepal. It took time for the DOR to complete the contract management procedures because such a contract for the maintenance of EIS was the first time for the DOR. It also took time for the DOR to select the appropriate contractor because the number of eligible candidates who can fulfill the selection criteria was limited. The operation and maintenance of EIS was still in the initial stage at the time of the Terminal

Evaluation because of the delay of contracting out of EIS.

#### **4.4 Impact (Prospects)**

At the time of the Terminal Evaluation, **many impacts were already confirmed.**

##### Prospect of achievement of the Overall Goal

- At the time of the Terminal Evaluation, the Overall Goal has been partially achieved, which can be assessed as some positive sign towards the achievement of the Overall Goal. The DOR need to make continuous efforts in cooperation with the DWIDP and the RBN to implement a series of safety measures, maintenance works and countermeasures for disasters, and to strengthen the operation and maintenance supported by the Project for the attainment of the Overall Goal.
- The efforts and initiatives of the DOR and the DWIDP for the Priority Projects were assessed as effectiveness of the Project because the scope of the Project included the Priority Projects that were designed to be undertaken with the fund of the GON. It is fair to say that such efforts and initiatives are positive signs towards the achievement of the Overall Goal.

##### Ripple effects

- After full opening of the Sindhuli Road in January 2015, many social and economic impacts have emerged. According to the results of the socio-economic survey conducted by the Project, the following positive impacts have been confirmed: 1) the number of houses and buildings has increased; 2) the number of business enterprises, institutions, shops and development activities has increased; 3) the land price has risen; 4) market-oriented agricultural activities were more observed; 5) the annual household's income has risen; 6) the travel cost to Kathmandu has decreased; 7) the frequency of using Sindhuli Road has increased, and so on.
- On the other hand, it was reported that the income gap has increased.
- From the long-term perspective, it is assumed that the traffic accidents are likely to occur frequently in accordance with the increased traffic volume in the Sindhuli Road.
- It is worth noting that the Sindhuli Road played a key role as a transportation route for daily necessities from the eastern Terai as well as an evacuation route from Kathmandu after the massive earthquake in April 2015. The Sindhuli Road has been recognized as the less damaged and reliable route, compared to other arterial roads. This can be also assessed as the positive impact.

#### **4.5 Sustainability (Prospects)**

It is fair to say that **the sustainability of the Project is likely to be to medium.** Results are summarized below:

### Policy aspect

- The DOR has demonstrated a policy commitment to aim for safe and reliable road traffic indicated in the Three-Year Interim Plan (2010/11–2012/13) and the Thirteenth Plan (2013/14–2015/16) by allocating a larger budget each year to maintenance and rehabilitation works of roads. The current policy is expected to be sustained after the completion of the Project. Thus, the sustainability in the policy aspect is likely to be high.

### Financial aspect

- The maintenance budget for the Sindhuli Road was allocated from the RBN based on the ARMP and the GON. According to the C/P of RBN, the DOR cannot fully implement the budget for maintenance for the Sindhuli Road almost every year, and carries it over to the next year's account. The adequate amount of the budget has been allocated by the RBN. The Project Manager of the DOR noted that the almost same amount of budget is likely to be allocated for at least two years after the completion of the Project because the SRMU will continue to be responsible for operation and maintenance work for the Sindhuli Road.
- However, the maintenance budget may not be enough to implement various maintenance and rehabilitation works in the coming years because of frequent natural disasters, increased traffic volume and exceeding of pavement life of DBST, especially in the Section IV. To secure the adequate budget after the phase out of the Project has become an issue for the DOR.
- At the time of the Terminal Evaluation, it was not clear to what extent the budget would be able to be allocated to the Sindhuli Road when the Ramtar Site Office and the Bardibas Site Office become under the jurisdiction of the Division Road Office Khurkot.
- The DWIDP has allocated forty million rupees for the Sindhuli Road in FY 2015/2016. According to the C/P of the DWIDP, the adequate budget is less likely to be continuously allocated to the Sindhuli Road after the phase out of the Project because of the limited budget of the DWIDP as a whole and the increasing demand for taking countermeasures against disasters in more high-priority places.
- Considering the above, the overall sustainability of the Project in the financial aspect is likely to be medium.

### Institutional aspect

- The Project has taken initiatives in strengthening the operation and maintenance system and establishing the road safety management system. The EIS developed by the Project is the first attempt for the DOR to provide the necessary information to road users duly and promptly. The EIS was just contracted out the contractor one month before the Terminal Evaluation. In addition, the DOR has not specified a section that is responsible for the overall management of EIS. The

operation and maintenance of EIS was still an issue at the time of the Terminal Evaluation although implementation of the EIS in a sustainable manner was recommended by the Mid-Term Review Study.

- The Ramtar Site Office was proposed and developed by the Project, assuming that it would function as one of the Division Offices in the future. Its institutional arrangements of the Ramtar Site Office including staffing and procurement of equipment needed for maintenance works have not been in place yet at time of the Terminal Evaluation although it was constructed. Furthermore, the actual implementation system for operation and maintenance works after the completion of the Project has yet to be clarified although it was proposed by the Japanese experts. It includes scope of work, scope of responsibility and authority among the Ramtar Site Office, the Bardibas Site Office and the Banepa Office.
- The DOR and the DWIDP have worked together based on the cooperative framework and the division of responsibilities during the implementation of the Project. However such framework is less likely to be sustained after the phase out of the Project because of the possibility of personnel transfer of C/Ps in each organization.
- Considering the above, the sustainability in the institutional aspect is relatively low to medium.

#### Organizational aspect

- The establishment of the Ramtar Site Office proposed by the Project is a remarkably positive outcome to ensure the sustainability of the Project in the organizational aspect. It is expected to play a role as the main site office for the Sindhuli Road after the completion of the Project.
- Both the Sindhuli Road Management Unit (SRMU) and the Sindhuli Road Disaster Preventive Unit (SRDPU) that were established in the DOR and the DWIDP by the Project have been working together for the implementation of the Project. At the time of the Terminal Evaluation, these two organizations are likely to be sustained by 2017 at least according to the C/Ps of both organizations. However, they are less likely to be sustained after the year of 2017.
- The sustainability in the organizational aspect is relatively high.

#### Technical aspect

- The capacity of the C/Ps of the DOR and the DWIDP has been gradually enhanced through various Project's activities. Most of them are likely to keep applying the obtained knowledge and skills at their work even after the completion of the Project.
- However, in the case of the DWIDP, they are less likely to apply the obtained knowledge and skills directly at their work if they are transferred to the Department of Irrigation.
- Thus, the sustainability of the technical aspect is thus assessed as relatively high.

## **5. Conclusion**

The Output 3 has been already achieved and the Output 1 and 3 are expected to be achieved completely by the end of the Project. The Project has a high degree of relevance and effectiveness, and a relatively high degree of efficiency. At the time of the Terminal Evaluation, many positive impacts have emerged. The results of the Terminal Evaluation confirmed that the Project Purpose was mostly achieved. Thus the Project is going to be terminated in January 2016 as scheduled.

To make the Project sustainable, it is recommended that the Nepalese side duly take into account the recommendations as listed below.

## **6. Recommendations**

The Team made the following recommendations to be implemented during the Project period based on the results of evaluation.

### **6.1 Recommendations to be implemented during the Project period**

#### **(1) Revising the indicators of the PDM**

The Team proposed to modify the indicators of the Overall Goal in the PDM Version 2 in order to verify the outcome of the project activities appropriately. It is recommended that the proposed PDM Version 3 be approved by the PCC immediately.

#### **(2) Taking over the overall management and activities of the Project from the Japanese experts**

The staff members of the SRMU employed by the Project have updated the road inventory, and disaster and maintenance records as well as the traffic accident record with the support of the Japanese experts. They have been also involved in filing documents and reports of the Project. The DOR immediately needs to take over the overall management of the Project and these activities before the phase out of the Project.

#### **(3) Reviewing and analyzing the results of SDI, the satisfaction of road users and the fatality ratio**

The C/Ps and the Japanese experts need to review and analyze the results of SDI, the satisfaction of road users and the fatality ratio to take effective measures and to achieve the Overall Goal.

#### **(4) Institutionalizing the cooperative framework and the division of responsibilities between the DOR and the DWIDP**

The DOR and the DWIDP have worked together for road disaster prevention works as per the agreed

framework. It is imperative to institutionalize such a cooperative framework and the division of responsibilities between the DOR and the DWIDP at the Ministry level. It is recommended that the C/Ps of both organizations draft the M/M with the support of the Japanese experts to sustain the cooperative framework and the demarcation policy in the area of road disaster prevention.

**(5) Clarifying the overall implementation system after the completion of the Project and making the necessary institutional arrangement**

The DOR urgently needs to clarify the overall implementation system for operation and maintenance works after the completion of the Project and make the necessary institutional arrangement including staffing, procurement of equipment and the division of responsibilities among the Ramtar Site Office, the Bardibas Site Office and the Banepa Office.

**6.2 Recommendations to be implemented after the termination of the Project**

**(1) Operating and maintaining the EIS in a sustainable manner**

It is recommended that the DOR operate and maintain the EIS in an appropriate and sustainable manner in cooperation with the contractor and the concerned parties such as media to provide the necessary information to road users duly and promptly. To sustain the EIS in the long term, specifying the section of the DOR that is responsible for the overall management of EIS is desired.

**(2) Keeping strengthening the operation and maintenance system and the traffic safety system of the Sindhuli Road**

Damages of the Sindhuli Road caused by natural disasters, increased traffic volume and exceeding of pavement life of DBST will be continuous concerns for the DOR. Thus, it is recommended that the DOR keep strengthening the operation and maintenance system and the traffic safety system in corporation with the DWIDP and the RBN to take the necessary countermeasures and to ensure the safe and smooth road traffic.

## **7. Lessons Learned**

The Team identified the following lessons learned from the Project.

### **(1) Long-term cooperation can generate synergy effects.**

The Sindhuli Road was constructed with the grant aid of the GOJ from 1996 to 2015. Some of the C/Ps of the DOR who worked in the Project for the construction of Sindhuli Road were assigned as the C/Ps and actively participated in the Project's activities. The C/Ps of the DWIDP also had work experience in several technical cooperation projects (1991-1998, 1999-2004) and the development study on Mugling-Narayanghat Road Prevention (2007-2009) supported by JICA. Some of the Japanese experts had the extensive work experiences in the DOR and the DWIDP. The mutual trust has contributed to implementing the overall activities smoothly and generating various effects and positive impacts of the Project. Such long-term cooperation can produce synergy effects because the established resources can be effectively utilized in a project.

### **(2) The roles, responsibilities, and activities of C/P agencies in a project must be clarified at the beginning of the project and spelled out in official documents.**

The cooperative framework and the division of responsibilities between the DOR and the DWIDP have been developed through discussions among the Project stakeholders, and signed in the M/M. Thus the two C/P agencies have worked together well. In a project implemented by multiple C/P agencies, the key to smooth coordination among them is to clarify their respective roles, responsibilities and activities. This must be agreed and described in official documents such as M/M.

### **(3) Inclusion of activities to be funded by counterpart agencies into the scope of a project is effective in enhancing a sense of ownership and responsibility and ensuring sustainability of a project**

Activities to be funded with the budget of C/P agencies are usually beyond the control of a project. However, with regard to activities directly related to a project and to be implemented by the same C/Ps, their inclusion in the scope of the project at the planning stage might be effective. It helps enhance a sense of ownership and responsibility of the C/Ps, and ensure the sustainability of the project.

-END-