

# **ANNEXES FOR FEASIBILITY STUDY**

**ANNEX F-8**

**SOCIO-ECONOMIC SURVEY RESULTS**

## ANNEX F-8

# SOCIO-ECONOMIC SURVEY RESULTS



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## **INTRODUCTION**

The Urban Research Institute (URI) was commissioned by the JICA Study Team to carry out a social and economic survey to gauge residents' concerns and perceptions regarding the improvement of roads 14A(i) and 16A in Southern Lao PDR. The survey was part of the "Improvement of Roads in Southern Lao PDR" project funded by JICA. The results of the study are to be utilized in the development of Initial Environmental Evaluations for both roads.

The surveys were carried out over a one-week period by a team of 12 surveyors using a questionnaire form developed with input from the JICA team as well as URI. The cooperation of local governments was obtained in helping to facilitate the process. Sixteen villages (250 households) on road 14A(i) and twelve villages (150 households) on road 16A were interviewed. The locations of the villages are provided in Figures 1 and 2.

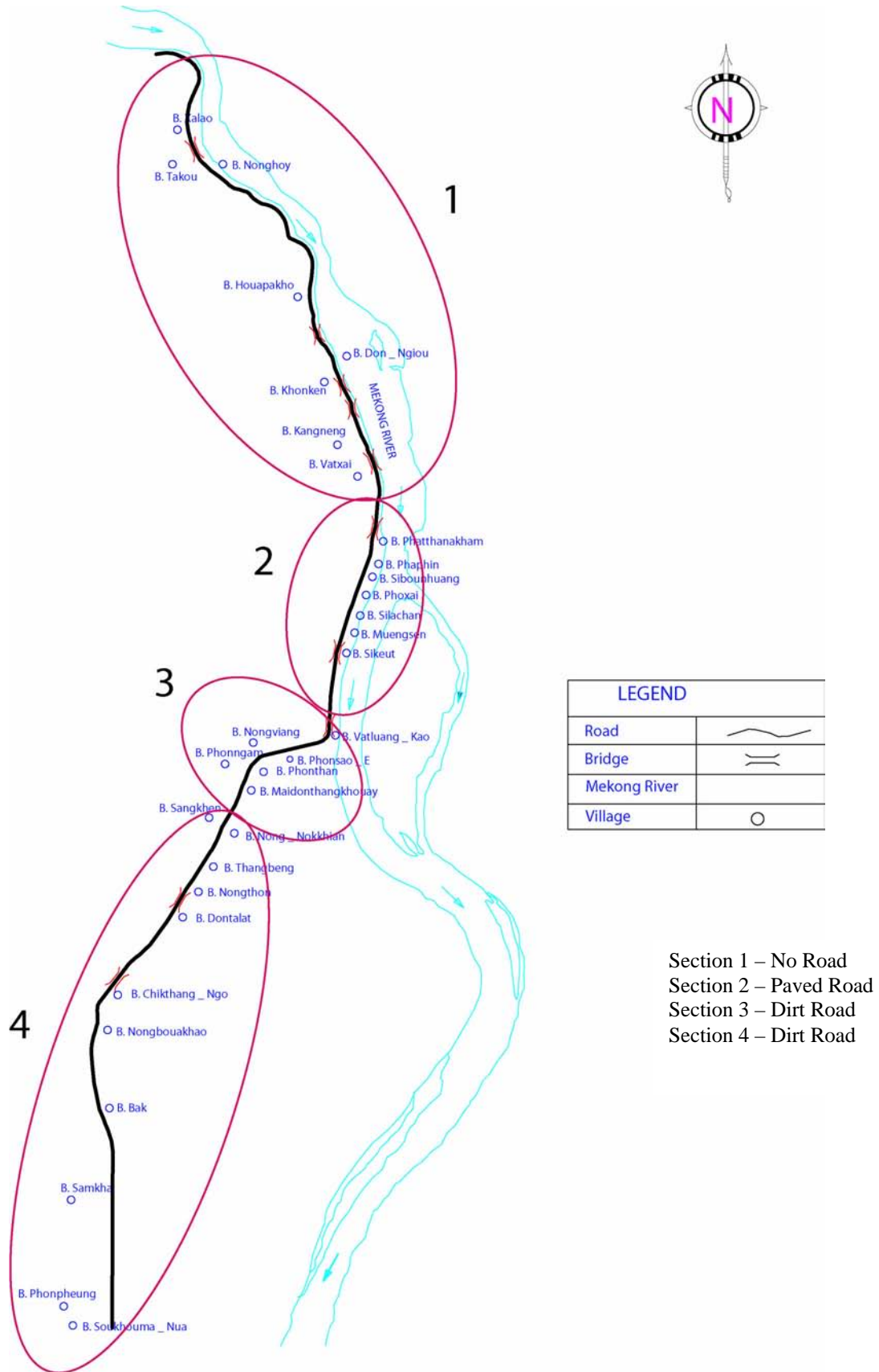


Figure 1: Map of Road 14A(i)

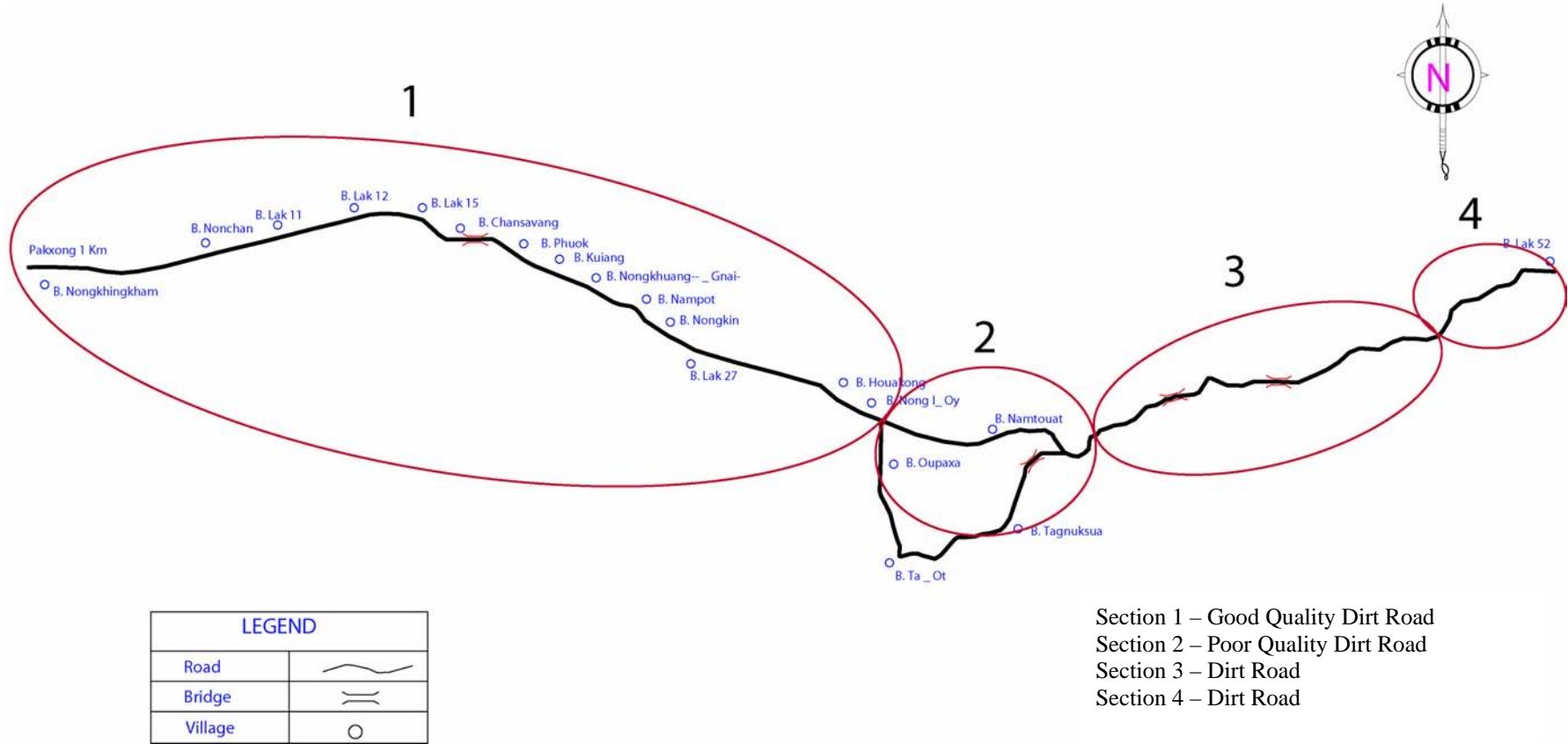


Figure 2: Map of Road 16A

## SUMMARY OF SOCIO-ECONOMIC SURVEY RESULT ROAD 14A(i)

This section presents a summary of socio-economic survey for Road 14A(i). Detailed survey results include village profiles, specific perspectives of the local communities on the existing road, proposed road improvements, impacts from the project on the environment and communities, infrastructure, facilities and services, and gender issues.

### 1. VILLAGE PROFILES

| Village Name      | Ethic Type | Population | Distance from Facilities and Services |                      |                      |                      |
|-------------------|------------|------------|---------------------------------------|----------------------|----------------------|----------------------|
|                   |            |            | School                                | Hospital             | Medical Clinic       | Nearest Urban Center |
| 1. Xalao          | Laoloum    | 802        | 3 km in Pakse                         | 5 km in Pakse        | 7 km in Pakse        | 7 km in Pakse        |
| 2. Nonghoy        | Laoloum    | 558        | 7 km in Pakse                         | 7 km in Pakse        | 7 km in Pakse        | 7 km in Pakse        |
| 3. Houapakho      | Laoloum    | 549        | 13 km in Champasack                   | 13 km in Champasack  | 13 km in Champasack  | 13 km in Champasack  |
| 4. Khonekhen      | Laoloum    | 659        | 12 km in Champasack                   | 12 km in Champasack  | 12 km in Champasack  | 12 km in Champasack  |
| 5. Watxai         | Laoloum    | 521        | 1 km in Champasack                    | 8 km in Champasack   | 8 km in Champasack   | 8 km in Champasack   |
| 6. Phaphin        | Laoloum    | 719        | In the village                        | 2.5 km in Champasack | 1.5 km in Champasack | 1.5 km in Champasack |
| 7. Phanthanakhham | Laoloum    | 614        | In the village                        | 2 km in Champasack   | 2 km in Champasack   | 2 km in Champasack   |
| 8. Phoxai         | Laoloum    | 448        | 1.5 km in Champasack                  | 1.5 km in Champasack | 1 km in Champasack   | 1 km in Champasack   |
| 9. Silachan       | Laoloum    | 426        | In the village                        | 2 km in Champasack   | 2 km in Champasack   | 1.3 km in Champasack |
| 10. Sikeut        | Laoloum    | 426        | 1.5 km in Champasack                  | 3 km in Champasack   | 4 km in Champasack   | 4 km in Champasack   |
| 11. Vatluang Kao  | Laoloum    | 436        | 7 km in Champasack                    | 7 km in Champasack   | 7 km in Champasack   | 7 km in Champasack   |
| 12. Nongvine      | Laoloum    | 514        | In the village                        | 7 km in Champasack   | 7 km in Champasack   | 7 km in Champasack   |



| Village Name     | Ethnic Type | Population | Distance from Facilities and Services |                     |                           |  |
|------------------|-------------|------------|---------------------------------------|---------------------|---------------------------|--|
|                  |             |            | School                                | Hospital            | Medical Clinic            | Nearest Urban Center                             |
| 13. Phonsao-E    | Laoloum     | 617        | 7 km in Champasack                    | 7 km in Champasack  | 7 km in Champasack        | 7 km in Champasack                               |
| 14. Ban Dontalat | Laoloum     | 1,301      | 15 km in Champasack                   | 15 km in Champasack | 15 km in Champasack       | 15 km in Champasack                              |
| 15. Nongbouakhao | Laoloum     | 472        | In the village                        | 16 km in Champasack | 6 km in Soukhouma village | 16 km in Champasack or 8 km in Soukhouma village |
| 16. Soukhouma    | Laoloum     | 865        | 0.5 km in Soukhouma                   | 0.5 km in Soukhouma | 0.5 km in Soukhouma       | 0.5 km in Soukhouma                              |

## **2. IMPRESSIONS ON THE PROPOSED ROAD PROJECT AND TRANSPORTATION MODES**

### **2.1 Overall impressions of proposed road improvement**

Generally local people in each village agreed with the proposed road improvement project. They expressed the view that the existing road is dirty and dusty, and in the rainy season is very difficult to travel on. They would like to have a clean road with good conditions. They want to see this project happen as soon as possible. However, people want the government to consider compensation for their land, houses and trees, which will be required by the project. In some parts of the road, local houses are located on the roadside, but people are willing to move if the existing road is to be improved and widened.

Local people realized that this proposed project would improve their access to several services and facilities such as for children to go to school. It will help also in transporting local goods for trade and reducing traveling time and cost. Moreover, it will support development and increase access to the World Heritage site (Wat-Phou Champasack). It is expected also that the project would also reduce the problems of dust in their villages caused by the present road conditions.

**2.2 Why do you travel to the district center or nearest town?**

| Village Name     | Sell agriculture products | Buy household goods and commodities | Go to government office | Go to hospital | Others |
|------------------|---------------------------|-------------------------------------|-------------------------|----------------|--------|
| 1. Xalao         | 12                        | 2                                   | 2                       | 6              | 6      |
| 2. Nonghoy       | 10                        | 1                                   | 2                       | 6              | 4      |
| 3. Houapakho     | 13                        | 3                                   | 5                       | 7              | 7      |
| 4. Khonekhen     | 16                        | 5                                   | 6                       | 8              | 9      |
| 5. Watxai        | 16                        | 16                                  | 1                       | 10             | 13     |
| 6. Phaphin       | 9                         | 6                                   | 10                      | 12             | 12     |
| 7. Phanthanakhm  | 2                         | 4                                   | 3                       | 8              | 15     |
| 8. Phoxai        | 7                         | 4                                   | 2                       | 13             | 7      |
| 9. Silachan      | 1                         | 1                                   | 3                       | 2              | 14     |
| 10. Sikeut       | 15                        | 7                                   | 5                       | 10             | 10     |
| 11. Vatluang Kao | 11                        | 8                                   | 2                       | 10             | 5      |
| 12. Nongvine     | 1                         | 2                                   | 8                       | 6              | 1      |
| 13. Phonsao-E    | 2                         | 3                                   | 11                      | 13             | 14     |
| 14. Ban Dontalat | 1                         | 2                                   | 2                       | 13             | 15     |
| 15. Nongbouakhao | 5                         | 2                                   | 10                      | 16             | 17     |
| 16. Soukhouma    | 2                         | 2                                   | 4                       | 11             | 13     |

**Summary**

The majority of the people primarily travel to the district center and other towns (Pakse and Champasack) to buy household goods and sell their agricultural products. The road will help to improve the local economy of the communities. With the new road, access to health care facilities will be increased thereby enhancing the quality of life of the villagers.

**2.3 What do the people usually buy from other places?**

| Village Name     | Food | Household needs | Electric equipment | Agriculture tools | Others |
|------------------|------|-----------------|--------------------|-------------------|--------|
| 1. Xalao         | 11   | 11              | 4                  | 5                 | 5      |
| 2. Nonghoy       | 10   | 12              | 1                  | 4                 | 2      |
| 3. Houapakho     | 16   | 17              | 7                  | 8                 | 4      |
| 4. Khonekhen     | 14   | 19              | 14                 | 13                | 4      |
| 5. Watxai        | 12   | 12              | 10                 | 10                | 13     |
| 6. Phaphin       | 9    | 12              | -                  | 1                 | 8      |
| 7. Phanthanakhm  | 18   | 17              | -                  | 6                 | 10     |
| 8. Phoxai        | 10   | 13              | 10                 | 5                 | 4      |
| 9. Silachan      | 7    | 14              | 4                  | 4                 | 7      |
| 10. Sikeut       | 14   | 14              | 9                  | 12                | 7      |
| 11. Vatluang Kao | 8    | 17              | 9                  | -                 | 8      |
| 12. Nongvine     | 8    | 17              | 2                  | 3                 | 1      |
| 13. Phonsao-E    | 16   | 13              | 14                 | 7                 | 16     |
| 14. Ban Dontalat | 6    | 12              | -                  | 1                 | 7      |
| 15. Nongbouakhao | 17   | 17              | 1                  | 17                | 17     |
| 16. Soukhouma    | 9    | 12              | 6                  | 5                 | 10     |

**Summary**

From the results, it is evident that people primarily travel to buy household goods and food.

## 2.4 How do you travel there?

| Village Name     | On foot | Bicycle | Bus | By boat | Motorcycle | Private vehicles |
|------------------|---------|---------|-----|---------|------------|------------------|
| 1. Xalao         | 2       | -       | -   | 12      | -          |                  |
| 2. Nonghoy       | -       | -       | -   | 12      | -          | 1                |
| 3. Houapakho     | 1       | 4       | -   | 17      | -          | -                |
| 4. Khonekhen     | -       | 4       | -   | 19      | -          | -                |
| 5. Watxai        | 10      | 13      | 1   | 12      | 5          | 13               |
| 6. Phaphin       | 5       | 8       | 10  | -       | 3          | 5                |
| 7. Phanthanakham | 4       | 7       | 5   | 2       | -          | 9                |
| 8. Phoxai        | 4       | 1       | 9   | -       | 4          | -                |
| 9. Silachan      | -       | -       | 15  | -       | -          | 2                |
| 10. Sikeut       | 1       | 3       | 16  | -       | 1          | 5                |
| 11. Vatluang Kao | -       | 13      | 11  | -       | 1          | -                |
| 12. Nongvine     | -       | 5       | 14  | -       | 3          | 2                |
| 13. Phonsao-E    | -       | 4       | 17  | -       | 8          | 3                |
| 14. Ban Dontalat | 7       | 2       | 10  | -       | 3          | 3                |
| 15. Nongbouakhao | 2       | 16      | 15  | -       | -          | -                |
| 16. Soukhouma    | 1       | 2       | 6   | -       | 12         | 11               |

### Summary

It is clear from the respondents that people travel primarily by public buses followed by bicycles and private vehicles. Only people in the missing link section of 25 km (Section 1 in Figure 1) travel by boat due to the lack of an accessible road. It will be possible for these people to have better access, be able to travel in a shorter, less costly, convenient and safer manner.

**2.5 How long does a typical trip take?**  
**2.6 How often do you use the existing road?**

| Village Name     | Traveling Time                                   | Frequently       |
|------------------|--|------------------|
| 1. Xalao         | 30 minutes by boat to Champasack and Pakse       | 3 times per week |
| 2. Nonghoy       | 60 minutes by boat to Champasack and Pakse       | 5 times per week |
| 3. Houapakho     | 120 minutes by boat to Champasack and Pakse      | 5 times per week |
| 4. Khonekhen     | 150 minutes by boat to Champasack and Pakse      | 4 times per week |
| 5. Watxai        | 30 minutes by boat to Champasack                 | 4 times per week |
| 6. Phaphin       | 5 minutes to Champasack and 180 minutes to Pakse | 4 times per week |
| 7. Phanthanakham | 180 minutes to Champasack and Pakse              | 5 times per week |
| 8. Phoxai        | 5 minutes to Champasack and 180 minutes to Pakse | 4 times per week |
| 9. Silachan      | 120 minutes to Pakse                             | 3 times per week |
| 10. Sikeut       | 120 minutes to Pakse                             | 4 times per week |
| 11. Vatluang Kao | 120 minutes to Pakse                             | 3 times per week |
| 12. Nongvine     | 120 minutes to Champasack and Pakse              | 4 times per week |
| 13. Phonsao-E    | 120 minutes to Champasack and Pakse              | 5 times per week |
| 14. Ban Dontalat | 120 minutes Champasack and Pakse                 | 3 times per week |
| 15. Nongbouakhao | 40 minutes to Dontalat and Champasack            | 5 times per week |
| 16. Soukhouma    | 180 minutes to B. Dontalat and Champasack        | 4 times per week |

**Summary**

People use the road as often as everyday to three times a week to Pakse and Champasack. Traveling time varied depending on the mode of transport, village location and the season.

### 3. PERCEPTION ON THE EXISTING AND THE PROPOSED ROAD

#### 3.1 Are there any problems with the existing road? What are those problems?

| Village Name     | Yes | No |
|------------------|-----|----|
| 1. Xalao         | 12  | -  |
| 2. Nonghoy       | 12  | -  |
| 3. Houapakho     | 16  | 1  |
| 4. Khonekhen     | 17  | 2  |
| 5. Watxai        | 13  | -  |
| 6. Phaphin       | 10  | 8  |
| 7. Phanthanakhom | 18  | -  |
| 8. Phoxai        | 1   | 2  |
| 9. Silachan      | 15  | -  |
| 10. Sikeut       | 15  | 4  |
| 11. Vatluang Kao | 6   | 1  |
| 12. Nongvine     | 17  | 1  |
| 13. Phonsao-E    | 16  | 8  |
| 14. Ban Dontalat | 19  | -  |
| 15. Nongbouakhao | 17  | -  |
| 16. Soukhouma    | 15  | -  |

In the section 1 (villages 1-5), Figure 1, the existing road is not accessible for vehicles. It is small, dirty and difficult to travel especially in the rainy season, and in the dry season it is dusty. There is no connection between the villages to other areas i.e. Pakse. People usually travel by boat, which is costly and time consuming. Thereby, for this section, which does not have road access, the proposed project is seen as a safer mode of transport compared to travelling by boat, which is especially dangerous during the rainy season.

For the rest of the road most people responded that the existing road is in poor conditions. During rainy season the existing road is muddy and difficult to access, and in dry season it is dusty.

**3.2 In case your children are not presently going to school, will your children go to schools or not if the road is to be improved and constructed?**

| Village Name      | Yes | No |
|-------------------|-----|----|
| 1. Xalao          | 12  | -  |
| 2. Nonghoy        | 10  | 2  |
| 3. Houapakho      | 17  | -  |
| 4. Khonekhen      | 19  | 2  |
| 5. Watxai         | 11  | 2  |
| 6. Phaphin        | 16  | 2  |
| 7. Phanthanakhham | 15  | 3  |
| 8. Phoxai         | 15  | 2  |
| 9. Silachan       | 15  | -  |
| 10. Sikeut        | 19  | -  |
| 11. Vatluang Kao  | 14  | 3  |
| 12. Nongvine      | 14  | 3  |
| 13. Phonsao-E     | 17  | -  |
| 14. Ban Dontalat  | 17  | 2  |
| 15. Nongbouakhao  | 17  | -  |
| 16. Soukhouma     | 15  | -  |

**For sections see Figure 1**

**Section 1 (villages 1-5)**

Children use only boats to access schools due to currently no road access. People consider that a good quality road will allow children to go to school easily and safely. If the road is improved in a better condition and clean, it will encourage children to go to school more often.

**Section 2 (villages 6-10)**

With the improvement of the road, most children will have better access to schools therefore it will be easier and safer for them to go to school. A good road and transportation provide opportunities for children to go to school.

**Section 3 (villages 11-13)**

Good road and transportation can facilitate and encourage the children to go to school.



**Section 4 (villages 14-16)**

Students normally like to go to school; good quality road and transportation will provide more opportunities for children to go to school regularly. People expressed the view that their children will be able to go to school if the road is improved.

### 3.3 How will the proposed road improvement assist you?

| Village Name     | Improve access to markets for agricultural products | Increase access to secondary school | Better access to medical care | Others |
|------------------|---|-------------------------------------|-------------------------------|--------|
| 1. Xalao         | 12  | 12                                  | 12                            | 6      |
| 2. Nonghoy       | 12  | 12                                  | 12                            | 5      |
| 3. Houapakho     | 17  | 17                                  | 13                            | 4      |
| 4. Khonekhen     | 19  | 19                                  | 19                            | 8      |
| 5. Watxai        | 13  | 12                                  | 13                            | 13     |
| 6. Phaphin       | 18  | 18                                  | 18                            | 7      |
| 7. Phanthanakhm  | 18  | 18                                  | 18                            | 13     |
| 8. Phoxai        | 15  | 14                                  | 15                            | 2      |
| 9. Silachan      | 14  | 14                                  | 15                            | 8      |
| 10. Sikeut       | 19  | 18                                  | 17                            | 8      |
| 11. Vatluang Kao | 17  | 13                                  | 15                            | -      |
| 12. Nongvine     | 15  | 16                                  | 17                            | 9      |
| 13. Phonsao-E    | 17  | 17                                  | 16                            | 17     |
| 14. Ban Dontalat | 19  | 19                                  | 19                            | 8      |
| 15. Nongbouakhao | 17  | 17                                  | 17                            | 17     |
| 16. Soukhouma    | 15  | 15                                  | 15                            | 11     |

#### Summary

The improved road project will help the people in accessing markets, schools and health care facilities. Access to all these places is important to the villagers.

#### 4. FISH CONSUMPTION AND PRODUCTION

| Village Name      | How often does your family eat fish in a week? | Do you manage a small-scale fishery business? | Will the proposed road improvements affect fish production? |    |
|-------------------|--|---|---|----|
|                   | Yes  |   | Yes   | No |
| 1. Xalao          | 5 day/week                                     | No  | 1   | 11 |
| 2. Nonghoy        | Everyday                                       | No  | 1   | 11 |
| 3. Houapakho      | Everyday                                       | No  | -   | 17 |
| 4. Khonekhen      | Everyday                                       | No  | -   | 19 |
| 5. Watxai         | Everyday                                       | No  | -   | 13 |
| 6. Phaphin        | 4 days/week                                    | No  | -   | 18 |
| 7. Phanthanakhham | 4 days/week                                    | No  | -   | 18 |
| 8. Phoxai         | 4 days/week                                    | No  | 1   | 16 |
| 9. Silachan       | 3 days/week                                    | No  | 3   | 12 |
| 10. Sikeut        | Everyday                                       | No  | 2   | 17 |
| 11. Vatluang Kao  | 5 days/week                                    | No  | -   | 17 |
| 12. Nongvine      | 4 days/week                                    | No  | -   | 17 |
| 13. Phonsao-E     | 5 days/week                                    | No  | 1   | 16 |
| 14. Ban Dontalat  | 3 days/week                                    | No  | -   | 19 |
| 15. Nongbouakhao  | 3 days/week                                    | No  | -   | 17 |
| 16. Soukhouma     | 3 days/week                                    | No  | -   | 15 |

#### Summary

None of the respondents manage a fishery business. The villagers do not think that the proposed road project will create any impacts on fish production.

## 5. VILLAGERS' PERCEPTIONS ON ENVIRONMENTAL ISSUES

### 5.1 Do you feel that the quality of your community's natural environment is generally acceptable?

| Village Name     | Yes | No |
|------------------|-----|----|
| 1. Xalao         | 11  | 1  |
| 2. Nonghoy       | 11  | 1  |
| 3. Houapakho     | 17  | -  |
| 4. Khonekhen     | 19  | -  |
| 5. Watxai        | 13  | -  |
| 6. Phaphin       | 16  | 2  |
| 7. Phanthanakham | 17  | 1  |
| 8. Phoxai        | 17  | -  |
| 9. Silachan      | 14  | -  |
| 10. Sikeut       | 17  | -  |
| 11. Vatluang Kao | 16  | 1  |
| 12. Nongvine     | 17  | -  |
| 13. Phonsao-E    | 11  | 6  |
| 14. Ban Dontalat | 17  | 2  |
| 15. Nongbouakhao | 12  | 5  |
| 16. Soukhouma    | 8   | 7  |

#### Summary

It is felt that the natural environment in the villages is generally good with the exception of dust problem. People rely on nature for food. Local people stated that since there are no factories around; there are no environmental problems. However, it should be noted that some of them do not have any comment on the environment because they do not understand the concept or the problem.

## 5.2 Do you feel that the proposed road improve/degrade the quality on the environment?

| Village Name     | Yes | No |
|------------------|-----|----|
| 1. Xalao         | 12  | -  |
| 2. Nonghoy       | 11  | 1  |
| 3. Houapakho     | 17  | -  |
| 4. Khonekhen     | 18  | 1  |
| 5. Watxai        | 13  | -  |
| 6. Phaphin       | 16  | 2  |
| 7. Phanthanakham | 17  | 1  |
| 8. Phoxai        | 17  | -  |
| 9. Silachan      | 12  | 3  |
| 10. Sikeut       | 13  | 4  |
| 11. Vatluang Kao | 15  | -  |
| 12. Nongvine     | 15  | 2  |
| 13. Phonsao-E    | 16  | 1  |
| 14. Ban Dontalat | 19  | -  |
| 15. Nongbouakhao | 16  | 1  |
| 16. Soukhouma    | 15  | -  |

### Summary

Most people feel that the proposed construction and improvement of the road will not affect the environment. The project may cause some impacts on land and trees, but people can accept this because of the number of benefits they see including encouraging local economy for buying and selling agriculture goods with other villages, providing access and improving quality of life. Improvement of the new road will make the villages clean. They realize that a better road will reduce flooding problems. If this project happens, it will be very useful for local people. However, some of them feel that the project will create minor impacts on the natural environment, agricultural areas, rice fields, and houses. In some instances the people could not respond to this question because they did not understand the concept of environment and what impacts the road improvements could have on the environment. It is important to note that people seem to understand the impacts from factories more than those from other kinds of development projects.

## 6. VILLAGERS' PERCEPTIONS ON INFRASTRUCTURE

### 6.1 Are you satisfied with the water quality and supply in your community?

| Village Name     | Yes | No | Do not know |
|------------------|-----|----|-------------|
| 1. Xalao         | 7   | 5  | -           |
| 2. Nonghoy       | 2   | 9  | 1           |
| 3. Houapakho     | 7   | 10 | -           |
| 4. Khonekhen     | -   | 18 | 1           |
| 5. Watxai        | 2   | 9  | 2           |
| 6. Phaphin       | -   | 18 | -           |
| 7. Phanthanakham | -   | 18 | -           |
| 8. Phoxai        | 2   | 14 | 1           |
| 9. Silachan      | 15  | -  | -           |
| 10. Sikeut       | 9   | 10 | -           |
| 11. Vatluang Kao | 7   | 6  | 1           |
| 12. Nongvine     | -   | 17 | -           |
| 13. Phonsao-E    | -   | 12 | 5           |
| 14. Ban Dontalat | 1   | 18 | -           |
| 15. Nongbouakhao | -   | 4  | 13          |
| 16. Soukhouma    | 8   | 7  | -           |

#### Summary

People normally use water from Mekong River and from underground wells but it is not clean, especially in the rainy season. They want to have a clean and regular water supply.

## 6.2 Are you satisfied with the quality of waste management in your community?

| Village Name      | Yes | No |
|-------------------|-----|----|
| 1. Xalao          | 9   | 3  |
| 2. Nonghoy        | 9   | 3  |
| 3. Houapakho      | 6   | 17 |
| 4. Khonekhen      | -   | 19 |
| 5. Watxai         | 3   | 10 |
| 6. Phaphin        | 12  | 6  |
| 7. Phanthanakhham | 1   | 17 |
| 8. Phoxai         | 2   | 15 |
| 9. Silachan       | 14  | 1  |
| 10. Sikeut        | 8   | 12 |
| 11. Vatluang Kao  | 9   | 8  |
| 12. Nongvine      | 9   | 8  |
| 13. Phonsao-E     | 4   | 13 |
| 14. Ban Dontalat  | 14  | 5  |
| 15. Nongbouakhao  | 7   | 10 |
| 16. Soukhouma     | 3   | 12 |

### Summary

There is no waste management system in the villages; therefore solid waste is an issue for most of the villages. However, local people are now dealing with this themselves by burning and putting their wastes in pits. Sometimes they work together to clean up the village areas. They want to have landfills near the villages. People normally throw their waste on the road. Therefore, it is important that the local authorities should increase local awareness and knowledge on waste management. It is also necessary to educate children on this. There is a suggestion that local authority should control and address the problem of waste by putting bins around village areas and providing knowledge on simple waste management and techniques.

### 6.3 Are you satisfied with the quality of sewage in your community?

| Village Name     | Yes | No | Do not know |
|------------------|-----|----|-------------|
| 1. Xalao         | 6   | 6  | -           |
| 2. Nonghoy       | 2   | 10 | -           |
| 3. Houapakho     | 5   | 12 | -           |
| 4. Khonekhen     | 1   | 15 | 3           |
| 5. Watxai        | 7   | 3  | 2           |
| 6. Phaphin       | 13  | 5  | -           |
| 7. Phanthanakham | 6   | 12 | -           |
| 8. Phoxai        | -   | 15 | 2           |
| 9. Silachan      | 15  | -  | -           |
| 10. Sikeut       | 15  | 4  | -           |
| 11. Vatluang Kao | 12  | 2  | 3           |
| 12. Nongvine     | 7   | 10 | -           |
| 13. Phonsao-E    | 1   | 12 | 4           |
| 14. Ban Dontalat | 17  | 2  | -           |
| 15. Nongbouakhao | 5   | 5  | 8           |
| 16. Soukhouma    | 1   | 15 | -           |

#### Summary

The majority are not satisfied with the quality of sewage in their communities. Most of them do not have toilets and wastewater treatment system due to a lack of financial resources. They also want to have a public drainage system. There is a suggestion that the government should help the community by providing a drainage system, knowledge on how to make simple toilets and how to deal with sewage.



## 7. VILLAGERS' AWARENESS ON ARCHEOLOGICAL OBJECTS

7.1 Are you aware of archaeological objects being discovered in your area?

7.2 Are you aware of places where these objects may be located?

| Village Name     | 7.1 Are you aware of archaeological objects being discovered in your area? |    | 7.2 Are you aware of places where these objects may be located? |    |
|------------------|--|----|---|----|
|                  | Yes  | No | Yes   | No |
| 1. Xalao         | 6  | 6  | 4   | 8  |
| 2. Nonghoy       | 5  | 7  | 5   | 7  |
| 3. Houapakho     | 5  | 12 | 4   | 13 |
| 4. Khonekhen     | 4  | 15 | 2   | 17 |
| 5. Watxai        | 3  | 8  | 4   | 7  |
| 6. Phaphin       | 3  | 15 | 3   | 15 |
| 7. Phanthanakham | 2  | 16 | 2   | 16 |
| 8. Phoxai        | 1  | 16 | 1   | 16 |
| 9. Silachan      | 13   | 2  | 10  | 5  |
| 10. Sikeut       | 17   | 2  | 17  | 2  |
| 11. Vatluang Kao | 9  | 8  | 9   | 8  |
| 12. Nongvine     | 10   | 7  | 10  | 7  |
| 13. Phonsao-E    | 14   | 2  | 17  | -  |
| 14. Ban Dontalat | -  | 19 | 19  | -  |
| 15. Nongbouakhao | -  | 17 | -   | 17 |
| 16. Soukhouma    | 4  | 11 | 1   | 14 |

### Summary

The villagers are fairly aware of the archeological discoveries in their area e.g. Nok-Ane cave, Phaphin temple, Wat That temple, old houses, ancient wal and ponds. They are also aware of where these resources are located. However, it is interesting to note that no one identified Wat Phou as an archeological object in this area.

## 8. AWARENESS AND CONCERNS REGARDING GENDER ISSUES

### 8.1 Will the improved road make things better for girls and women in the village?

| Village Name     | Yes | No |
|------------------|-----|----|
| 1. Xalao         | 12  | -  |
| 2. Nonghoy       | 12  | -  |
| 3. Houapakho     | 17  | -  |
| 4. Khonekhen     | 19  | -  |
| 5. Watxai        | 8   | 3  |
| 6. Phaphin       | 18  | -  |
| 7. Phanthanakham | 18  | -  |
| 8. Phoxai        | 17  | -  |
| 9. Silachan      | 15  | -  |
| 10. Sikeut       | 19  | -  |
| 11. Vatluang Kao | 17  | -  |
| 12. Nongvine     | 17  | -  |
| 13. Phonsao-E    | 17  | -  |
| 14. Ban Dontalat | 19  | -  |
| 15. Nongbouakhao | 17  | -  |
| 16. Soukhouma    | 15  | -  |

#### Summary

The good road can help women travel safely. It will improve access for women to attend schools and other services as well as better access to the market to sell goods, which will help to improve their living conditions.

## 9. IMPACT OF ROAD IMPROVEMENTS SPECIFICALLY ON THE VARIOUS MINORITY GROUPS

### 9.1 Will the improved road have a negative/ positive impact on the lifestyle and spiritual traditions of your community?

| Village Name     | Change | No change |
|------------------|--------|-----------|
| 1. Xalao         | 2      | 10        |
| 2. Nonghoy       | 1      | 11        |
| 3. Houapakho     | 2      | 15        |
| 4. Khonekhen     | 1      | 18        |
| 5. Watxai        | -      | 9         |
| 6. Phaphin       | -      | 18        |
| 7. Phanthanakhm  | -      | 18        |
| 8. Phoxai        | 3      | 14        |
| 9. Silachan      | 3      | 12        |
| 10. Sikeut       | 3      | 13        |
| 11. Vatluang Kao | 4      | 13        |
| 12. Nongvine     | -      | 17        |
| 13. Phonsao-E    | 6      | 11        |
| 14. Ban Dontalat | -      | 19        |
| 15. Nongbouakhao | 4      | 13        |
| 16. Soukhouma    | -      | 15        |

#### Summary

Positive impacts are obviously seen from villagers' response. They include better local transportation system, more opportunities for local economic development, better living conditions and more safety. The majority of the people do not foresee any negative impacts to their life and environment. But there are some people who recognize the negative impacts of more accidents in the future or the interruption of agricultural activities during the construction period.

## 10. OVERALL COMMENTS

Generally local people in the project area have a very positive view on the improvement of road 14A(i). They expect a number of benefits to their communities including:

- Easy access for children to go to school and for people to travel to social services and government offices.
- Local business opportunities.
- Solution of the dust problem in the dry season.
- Solution of the flooding situation in the rainy season.
- Possibly improved safety.
- Increase access to Wat Phou

Local people do realize that there will be immediate negative impacts from the road improvement project such as loss of some trees, agricultural land and relocation. In addition, some of them are also aware of long-term impacts e.g. more accidents in the future. It is important to note that they do not anticipate any impacts of the road project on the environment and culture of their communities. They indicated that they are willing to relocate if their land is required by the project. Most of them have a concern about compensation for land, rice fields and for relocation costs. They would like to be informed by the government on how the compensation process will be handled. One comment from several people was that they would like the government to also consider the improvement of internal roads within the villages, and not only the highway.

The majority of respondents reported that their primary use of the existing road was to go to the hospital followed by traveling to the markets to sell agricultural products and to access government offices. Based on survey result, it is interesting to note that none of the respondents run fishery business in the area and thereby most of them do not expect any negative impacts on fish production.

People who live in the missing link section (Section 1) have no other choice but to travel by boat due to the poor condition of the existing road. From their perspectives traveling by boat is very dangerous, especially during the rainy season. It also takes more time and money to go to Pakse or Champasack than it would by road. Most of the people in other areas (Section 2, 3, 4) use public buses and bicycles as major modes of transportation. Average travel times can range from 20 minutes to 1 hour to go to Champasack and approximately 1-2 hours to Pakse depending on the mode of transportation and the season. In the rainy season it usually takes more time to travel to other places due to flooding and muddy road conditions. In the raining season only buses, trucks or private vehicles can pass on the road. Local communities expect that the improvement of the existing road will reduce time and cost for their travel.

In the area around Wat Phou, some people expressed that they would prefer to have the existing road improved rather than constructing a new road away from their houses. If the new road is to be constructed, the existing road should be taken into consideration for improving its quality upto a certain level.

## SUMMARY OF SOCIO-ECONOMIC SURVEY RESULT ROAD 16A

This section presents a summary of socio-economic survey for Road 16A. Detailed survey results include village profiles, specific perspectives of the local communities on the existing road, proposed road improvements, impacts from the project on the environment and communities, infrastructure, facilities and services, and gender issues.

### 1. VILLAGE PROFILES

| Village Name       | Ethnic Type           | Population     | Distance from Social Facilities |                                 |                                 |                  |
|--------------------|-----------------------|----------------|---------------------------------|---------------------------------|---------------------------------|------------------|
|                    |                       |                | School                          | Hospital                        | Medical Clinic                  | Urban Center     |
| 1. Nongkhingkham   | Lao Theung/ Lavenh    | 197 households | In the village                  | 0.5 km in Paksong               | 0.5 km in Paksong               | 1km in Paksong   |
| 2. Nonchan         | Lao Theung/ Lavenh    | Not available  | 8 km in Paksong                 | 8 km in Paksong                 | 8 km in Paksong                 | 8 km in Paksong  |
| 3. B. Lak 11       | Lao Theung/ Lavenh    | Not available  | In the village                  | 11 km in Paksong                | 6 km at Ban Chansavang          | 11 km in Paksong |
| 4. B. Lak 15       | Laoloum/ Lavenh       | Not available  | In the village                  | 15 km in Paksong                | 2 km at Ban Chansavang          | 15 km in Paksong |
| 5. Chansavang      | Laoloum               | 120 households | 17 km in Paksong                | 17 km in Paksong                | 17 km in Paksong                | 17 km in Paksong |
| 6. Nongkhuang Gnai | Lao Theung/ Lavenh    | Not available  | In the village                  | 22 km in Paksong                | 5 km at Ban Chansavang          | 22 km in Paksong |
| 7. Nongkin         | Lao Theung/ Lavenh    | Not available  | In the village                  | 25 km in Paksong                | 3 km at focal point             | 25 km in Paksong |
| 8. Houakong        | Thai Deng/ Lavenh     | 139 households | In the village                  | 3 km at the new village project | 3 km at the new village project | 35 km in Paksong |
| 9. Nong I oy       | Lao Theung/ Lavenh    | Not available  | In the village                  | 34 km in Paksong                | 7 km at focal point             | 34 km in Paksong |
| 10. Tagnuksua      | Lao Theung/ Yaheun    | Not available  | In the village                  | 44 km in Paksong                | 44 km in Paksong                | 94 km in Pakse   |
| 11. Namtouat       | Lao Theung/ Yaheun    | 145 people     | In the village                  | 47 km in Paksong                | 13 km at focal point            | 47 km in Paksong |
| 12. B. Lak 52      | Laoloum/ Alak, Khamou | Not available  | In the village                  | 27 km in Xekong                 | 0.3 km in Xekong                | 27 km in Xekong  |

## 2. IMPRESSIONS ON THE PROPOSED ROAD PROJECT AND TRANSPORTATION MODES

### 2.1 Overall impressions of proposed road improvement

The majority would like the road to be constructed since it will ease local travel, improve access to schools and other services and help in the transport of their goods to the district center. Besides that the new road will increase accessibility to the village and reduce travel time and cost therefore more people will come to their villages. It will also improve the communities profile if the road passes through their village.

### 2.2 Why do you travel to the district center or nearest town?

| Village Name       | Sell agriculture products | Sell household needs and commodities | Go to government office | Go to hospital | Others |
|--------------------|---------------------------|--------------------------------------|-------------------------|----------------|--------|
| 1. Nongkhingkham   | 5                         | 1                                    | 0                       | 4              | 7      |
| 2. Nonchan         | 9                         | 2                                    | 1                       | 7              | 5      |
| 3. B. Lak 11       | 9                         | 1                                    | 5                       | 5              | 1      |
| 4. B. Lak 15       | 9                         | 3                                    | 1                       | 6              | 0      |
| 5. Chansavang      | 7                         | 1                                    | 1                       | 6              | 2      |
| 6. Nongkhuang Gnai | 1                         | 0                                    | 0                       | 8              | 0      |
| 7. Nongkin         | 4                         | 2                                    | 0                       | 3              | 0      |
| 8. Houakong        | 7                         | 1                                    | 5                       | 2              | 1      |
| 9. Nong I oy       | 3                         | 0                                    | 1                       | 6              | 5      |
| 10. Tagnuksua      | 3                         | 1                                    | 1                       | 6              | 4      |
| 11. Namtouat       | 1                         | 3                                    | 1                       | 6              | 2      |
| 12. B. Lak 52      | 2                         | 8                                    | 0                       | 0              | 6      |

### Summary

The road would help to bring about economic development among the villagers, as it will help in improving their access to the district center or nearest town for selling their agricultural products. It will also improve access to basic health facilities.

### 2.3 What do the people usually buy from other places?

| Village Name       | Food | Household needs | Electric equipment | Agriculture tools |
|--------------------|------|-----------------|--------------------|-------------------|
| 1. Nongkhingkham   | 9    | 7               | 2                  | -                 |
| 2. Nonchan         | 10   | 10              | -                  | 3                 |
| 3. B. Lak 11       | 11   | 10              | -                  | 7                 |
| 4. B. Lak 15       | 17   | 8               | -                  | 5                 |
| 5. Chansavang      | 12   | 10              | -                  | 4                 |
| 6. Nongkhuang Gnai | 7    | 8               | -                  | 3                 |
| 7. Nongkin         | 5    | 8               | -                  | 1                 |
| 8. Houakong        | 6    | 6               | 1                  | 3                 |
| 9. Nong I oy       | 4    | 4               | -                  | 2                 |
| 10. Tagnuksua      | 4    | 5               | -                  | -                 |
| 11. Namtouat       | 8    | 10              | -                  | 2                 |
| 12. B. Lak 52      | 16   | 16              | 22                 | -                 |

#### Summary

From the results, it is evident that people primarily travel to buy household goods and food.



## 2.4 How do you travel there?

| Village Name       | On foot | Bicycle | Bus | By boat | Motorcycle | Private vehicles |
|--------------------|---------|---------|-----|---------|------------|------------------|
| 1. Nongkhingkhham  | 1       | 1       | 6   | 1       | 4          | 3                |
| 2. Nonchan         | 1       | 2       | 6   | -       | 2          | 8                |
| 3. B. Lak 11       | -       | 5       | 7   | -       | 5          | 4                |
| 4. B. Lak 15       | 1       | 1       | 14  | -       | 2          | 7                |
| 5. Chansavang      | -       | 1       | 12  | -       | -          | -                |
| 6. Nongkhuang Gnai | -       | 1       | 9   | -       | 3          | Hand Truck       |
| 7. Nongkin         | -       | -       | 6   | -       | 3          | 4                |
| 8. Houakong        | -       | -       | 10  | -       | 4          | Private car      |
| 9. Nong I oy       | -       | 1       | 3   | 3       | 2          | -                |
| 10. Tagnuksua      | 2       | 9       | 4   | -       | 2          | Hand Truck       |
| 11. Namtouat       | -       | 4       | 8   | -       | 2          | -                |
| 12. B. Lak 52      | 1       | 1       | 22  | -       | 1          | -                |

### Summary

The people travel primarily by public buses followed by motorcycles, bicycles, and private vehicles.

**2.5 How long does a typical trip take time?**  
**2.6 How often that you use this existing road?**

| Village Name       | Travel Time            |
|--------------------|------------------------|
| 1. Nongkhingkham   | 1 hour                 |
| 2. Nonchan         | 1 hour and 30 minutes  |
| 3. B. Lak 11       | 1hour                  |
| 4. B. Lak 15       | 2 hours                |
| 5. Chansavang      | 3 hours                |
| 6. Nongkhuang Gnai | 2 hours                |
| 7. Nongkin         | 3 hours                |
| 8. Houakong        | 1hour and 30 minutes   |
| 9. Nong I oy       | 3 hours                |
| 10. Tagnuksua      | 2 hours                |
| 11. Namtouat       | 3 hours                |
| 12. B. Lak 52      | 2 hours and 30 minutes |

**Summary**

The majority of villagers use the existing road everyday. Travel time can range from 1-3 hours to go to Pakse, Paksong or Attapur, depending on the season and the location. The improvement of the existing road will help to reduce the travel time of local people especially in the rainy season.

### 3. PERCEPTION ON THE EXISTING AND THE PROPOSED ROAD

#### 3.1 Are there any problems with the existing road? What are those problems?

| Village Name       | Yes | No |
|--------------------|-----|----|
| 1. Nongkhingkham   | 6   | 4  |
| 2. Nonchan         | 10  | 3  |
| 3. B. Lak 11       | 10  | 1  |
| 4. B. Lak 15       | 17  | 1  |
| 5. Chansavang      | 12  | -  |
| 6. Nongkhuang Gnai | 12  | -  |
| 7. Nongkin         | 7   | 1  |
| 8. Houakong        | 10  | -  |
| 9. Nong I oy       | 6   | 1  |
| 10. Tagnuksua      | 7   | 1  |
| 11. Namtouat       | 11  | 1  |
| 12. B. Lak 52      | 21  | 2  |

#### Summary

Most of the people thought that the existing road condition is poor. Especially in the rainy season the road is muddy with potholes and prone to road blocks due to landslides. It is inconvenient and takes long time to travel. It is also difficult to access because of narrow road and this may cause the road accidents. They also need to have lights along the road.

### 3.2 In case your children are not presently going to school, will your children go to schools or not if the road is improved?

| Village Name       | Yes | No |
|--------------------|-----|----|
| 1. Nongkhingkham   | 7   | 3  |
| 2. Nonchan         | 8   | 5  |
| 3. B. Lak 11       | 10  | 1  |
| 4. B. Lak 15       | 13  | 4  |
| 5. Chansavang      | 12  | 2  |
| 6. Nongkhuang Gnai | 10  | 2  |
| 7. Nongkin         | 2   | 6  |
| 8. Houakong        | 9   | 1  |
| 9. Nong I oy       | 4   | 3  |
| 10. Tagnuksua      | 6   | 3  |
| 11. Namtouat       | 7   | 5  |
| 12. B. Lak 52      | 11  | 11 |

#### Summary

The improvement of the existing road would bring about a possible change in the educational level of the villages as a significant number of people are willing to send their children to school if the present road is improved. However there is no guarantee that having a better road will encourage everyone to send their children to school because there are other factors that influence their decisions e.g. lack of financial resources to pay for school fees and buses, and long distances between home and school.

### 3.3 How will the proposed road improvement assist you?

| Village Name       | Improve access to markets for product | Increase access to secondary schools | Better access to medical care | Others   |
|--------------------|---------------------------------------|--------------------------------------|-------------------------------|--|
| 1. Nongkhingkham   | 6                                     | 2                                    | 3                             | 9  |
| 2. Nonchan         | 10                                    | 7                                    | 6                             | 8  |
| 3. B. Lak 11       | 11                                    | 7                                    | 7                             | Easy to access   |
| 4. B. Lak 15       | 12                                    | 9                                    | 9                             | Fast and safety for traveling, good for selling the local product, poverty alleviation, sell product at higher price   |
| 5. Chansavang      | 9                                     | 9                                    | 6                             | 8  |
| 6. Nongkhuang Gnai | 10                                    | 10                                   | 8                             | 9  |
| 7. Nongkin         | 7                                     | 7                                    | 7                             | Easy to access   |
| 8. Houakong        | 10                                    | 6                                    | 4                             | 4  |
| 9. Nong I oy       | 7                                     | 5                                    | 4                             | 2  |
| 10. Tagnuksua      | 8                                     | 3                                    | 6                             | 4  |
| 11. Namtouat       | 12                                    | 9                                    | 12                            | 6  |
| 12. B. Lak 52      | 18                                    | 12                                   | 12                            | It is convenient to travel to Pakse and Paksong, convenient for using the vehicles, and easy to visit relatives. It is good for selling the product. The electricity will come soon. |

#### Summary

The road improvement project will be primarily useful to the villagers in accessing markets to buy and sell agricultural goods. It will also improve their access to schools and medical facilities. Other benefits from this project will be convenient to travel to Pakse and Paksong and it will reduce travel time. With the improvement of the road the villagers are hopeful that other developments such as electricity and other business would follow.

#### 4. FISH CONSUMPTION AND PRODUCTION

| Village Name       | How often does your family eat fish in a week? | Do you manage a small-scale fishery business? |    | Will the proposed road improvements affect fish production? |    |
|--------------------|--|---|----|---|----|
|                    | Yes  | Yes   | No | Yes   | No |
| 1. Nongkhingkham   | The majority eat fish.                         | 1   | 9  |   | 10 |
| 2. Nonchan         | The majority do not eat fish.                  | 1   | 12 |   | 13 |
| 3. B. Lak 11       | The majority eat fish.                         | 2   | 9  | 1   | 10 |
| 4. B. Lak 15       | The majority do not eat fish.                  | 3   | 13 |   | 12 |
| 5. Chansavang      | The majority do not eat fish.                  | 1   | 12 |   | 12 |
| 6. Nongkhuang Gnai | The majority eat fish.                         |   | 12 |   | 12 |
| 7. Nongkin         | The majority eat fish.                         |   | 8  |   | 8  |
| 8. Houakong        | The majority eat fish.                         |   | 10 |   | 10 |
| 9. Nong I oy       | The majority do not eat fish.                  |   | 8  |   | 8  |
| 10. Tagnuksua      | The majority eat fish.                         | 8   |    | 1   | 7  |
| 11. Namtouat       | The majority eat fish.                         |   | 12 |   | 12 |
| 12. B. Lak 52      | The majority eat fish.                         | 1   | 21 |   | 22 |

#### Summary

Majority of local people do not manage any fishery business and do not think that the proposed road improvement project will create adverse impacts on the fish production.

## 5. VILLAGERS' PERCEPTIONS ON ENVIRONMENTAL ISSUES

### 5.1 Do you feel that the quality of your community's natural environment is generally acceptable?

| Village Name       | Yes | No |
|--------------------|-----|----|
| 1. Nongkhingkham   | 9   | 1  |
| 2. Nonchan         | 10  | 3  |
| 3. B. Lak 11       | 6   | 5  |
| 4. B. Lak 15       | 13  | 5  |
| 5. Chansavang      | 7   | 5  |
| 6. Nongkhuang Gnai | 5   | 7  |
| 7. Nongkin         | 4   | 4  |
| 8. Houakong        | 6   | 4  |
| 9. Nong I oy       | 6   | 2  |
| 10. Tagnuksua      | 6   | 2  |
| 11. Namtouat       | 10  | 2  |
| 12. B. Lak 52      | 16  | 7  |

#### Summary

From majority of the respondents' responses, the present natural environment is good and acceptable. The environment is wealthy and the villages are clean. The problem of dust is seen as an important environmental issue.

## 5.2 Do you feel that the proposed road improve/degrade the quality on the environment?

| Village Name       | Improve | Degrade |
|--------------------|---------|---------|
| 1. Nongkhingkham   | 9       | 1       |
| 2. Nonchan         | 11      | 2       |
| 3. B. Lak 11       | 11      | -       |
| 4. B. Lak 15       | 15      | 2       |
| 5. Chansavang      | 12      | -       |
| 6. Nongkhuang Gnai | 10      | 2       |
| 7. Nongkin         | 7       | -       |
| 8. Houakong        | 8       | 2       |
| 9. Nong I oy       | 4       | 5       |
| 10. Tagnuksua      | 8       | -       |
| 11. Namtouat       | 12      | -       |
| 12. B. Lak 52      | 21      | -       |

### Summary

The proposed road will improve the quality of the environment. It will reduce dust and mud and make the villages clean. However there are a few respondents in all the villages who think that there will be an increasing problem of air and noise pollution due to increase in traffic. The survey results show that a majority think that there will be an improvement in the quality of environment after the road is constructed in terms of improved quality of life and less dust pollution.



## 6. VILLAGERS' PERCEPTIONS ON INFRASTRUCTURE

### 6.1 Are you satisfied with the water quality and supply in your community?

| Village Name       | Yes | No |
|--------------------|-----|----|
| 1. Nongkhingkham   | 3   | 7  |
| 2. Nonchan         | 3   | 10 |
| 3. B. Lak 11       | 2   | 9  |
| 4. B. Lak 15       | 2   | 13 |
| 5. Chansavang      | 6   | 6  |
| 6. Nongkhuang Gnai | 3   | 9  |
| 7. Nongkin         | 6   | 2  |
| 8. Houakong        | 8   | 2  |
| 9. Nong I oy       | 3   | 5  |
| 10. Tagnuksua      | 1   | 7  |
| 11. Namtouat       | 4   | 6  |
| 12. B. Lak 52      | 18  | 4  |

#### Summary

The majority of villagers are not satisfied with water quality. The need for clean and safe potable water is significant in all the villages. As a solution to this the villagers suggested that they need to dig tube wells.

## 6.2 Are you satisfied with the quality of waste management in your community?

| Village Name       | Yes | No | Do not Know |
|--------------------|-----|----|-------------|
| 1. Nongkhingkham   | 1   | 9  | -           |
| 2. Nonchan         | 7   | 6  | 1           |
| 3. B. Lak 11       | 10  |    | 1           |
| 4. B. Lak 15       | 4   | 11 | 3           |
| 5. Chansavang      | 6   | 6  | -           |
| 6. Nongkhuang Gnai | 3   | 9  | -           |
| 7. Nongkin         | 5   | 3  | -           |
| 8. Houakong        | 4   | 6  | -           |
| 9. Nong I oy       | 1   | 7  | -           |
| 10. Tagnuksua      | 3   | 5  | -           |
| 11. Namtouat       | 7   | 5  | -           |
| 12. B. Lak 52      | 8   | 15 | -           |

### Summary

There is a waste management issue in the villages which needs to be addressed. According to the survey the villagers are unaware of how to dispose their waste. Most of it is dumped and burned in open spaces. They need to have an organization to collect waste and educate them how to manage it. Some suggested that there should be the dumping site.

### 6.3 Are you satisfied with the quality of sewage in your community?

| Village Name       | Yes | No |
|--------------------|-----|----|
| 1. Nongkhingkham   | 6   | 4  |
| 2. Nonchan         | 1   | 11 |
| 3. B. Lak 11       |     | 11 |
| 4. B. Lak 15       | 1   | 16 |
| 5. Chansavang      | 3   | 9  |
| 6. Nongkhuang Gnai |     | 12 |
| 7. Nongkin         |     | 8  |
| 8. Houakong        |     | 10 |
| 9. Nong I oy       |     | 8  |
| 10. Tagnuksua      |     | 8  |
| 11. Namtouat       |     | 12 |
| 12. B. Lak 52      | 2   | 20 |

#### Summary

The majority of them have never used pit. They do not have money to construct and do not know how to construct. Some of them have low incomes so they cannot afford to have toilets. They need some organization to help them provide the toilets and also educated them how to deal with sewage.

## 7. VILLAGERS' AWARENESS ON ARCHEOLOGICAL AND NATURAL RESOURCES

7.1 Are you aware of archaeological objects being discovered in your area?

7.2 Are you aware of places where these objects may be located?

| Village Name       | 7.1 Are you aware of archeological/ natural resources being discovered in your area? |    | 7.2 Are you aware of places where these objects may be located? |    |
|--------------------|--|----|---|----|
|                    | Yes  | No | Yes   | No |
| 1. Nongkhingkham   | -  | 10 | 2   | 8  |
| 2. Nonchan         | 1  | 12 | 1   | 12 |
| 3. B. Lak 11       | 2  | 9  | 2   | 9  |
| 4. B. Lak 15       | -  | 17 | -   | 17 |
| 5. Chansavang      | -  | 12 | -   | 12 |
| 6. Nongkhuang Gnai | -  | 12 | -   | 12 |
| 7. Nongkin         | -  | 7  | -   | 8  |
| 8. Houakong        | -  | 10 | -   | 10 |
| 9. Nong I oy       | -  | 8  | -   | 8  |
| 10. Tagnuksua      | 1  | 7  | 2   | 6  |
| 11. Namtouat       | -  | 12 | -   | 12 |
| 12. B. Lak 52      | 1  | 21 | 1   | 21 |

### Summary

The villagers in the surveyed villages are largely unaware of archeological and natural resources in and around their villages.

## 8. AWARENESS AND CONCERNS REGARDING GENDER ISSUES

### 8.1 Will the improved road make things better for girls and women in the village?

| Village Name       | Yes | No |
|--------------------|-----|----|
| 1. Nongkhingham    | 10  | -  |
| 2. Nonchan         | 13  | -  |
| 3. B. Lak 11       | 11  | -  |
| 4. B. Lak 15       | 17  | -  |
| 5. Chansavang      | 12  | -  |
| 6. Nongkhuang Gnai | 12  | -  |
| 7. Nongkin         | 8   | -  |
| 8. Houakong        | 10  | -  |
| 9. Nong I oy       | 8   | -  |
| 10. Tagnuksua      | 8   | -  |
| 11. Namtouat       | 12  | -  |
| 12. B. Lak 52      | 22  | -  |

#### Summary

All the respondents in all the villages have agreed that the road improvement project will help improve women' lives by giving them more convenience for travelling, access to school, health care and economic opportunities to sell their goods.

## 9. IMPACT OF ROAD IMPROVEMENTS SPECIFICALLY ON THE VARIOUS MINORITY GROUPS

### 9.1 Will the improved road have a negative/ positive impact on the lifestyle and spiritual traditions of your community?

| Village Name       | Yes | No |
|--------------------|-----|----|
| 1. Nongkhingkham   | -   | 10 |
| 2. Nonchan         | -   | 13 |
| 3. B. Lak 11       | -   | 11 |
| 4. B. Lak 15       | -   | 17 |
| 5. Chansavang      | -   | 12 |
| 6. Nongkhuang Gnai | -   | 12 |
| 7. Nongkin         | -   | 8  |
| 8. Houakong        | -   | 10 |
| 9. Nong I oy       | -   | 8  |
| 10. Tagnuksua      | -   | 8  |
| 11. Namtouat       | -   | 12 |
| 12. B. Lak 52      | -   | 22 |

#### Summary

It should be noted that all the respondents are not aware of any negative impacts from the road improvement project on the cultural and spiritual traditions of the communities.

## 10. OVERALL COMMENTS

Generally local people in the project area have very positive views on the improvement of Road 16A. They want to have a better quality of road and expect a number of benefits from the road improvement project to their communities including the following factors:

- Easy access for children to go to school and for people to travel to social services and government offices.
- Economic development and business opportunities.
- Solution of the dust problem in the dry season.
- Release the problem of muddy road during the rainy season.
- Improved safety especially when traveling at night.

Local people realize some immediate negative impacts from the road improvement project such as the loss of some trees, land and coffee plantation areas. In addition some of them are also aware of long-term impacts i.e. more accidents in the future, higher risks to their children from high-speed vehicles passing along this Road, air and noise pollution due to increased traffic. However they still prefer to have a high standard road in order to address the problems of dust in the dry season and muddy roads in the rainy season. Local communities expressed concern that impacts from road improvements are insignificant and can be acceptable. They are also willing to relocate if their land is required by the project. The majority of respondents use the road to go to the hospital followed by trips to the market to sell agricultural products and government offices. This indicates the importance of health care facilities for these communities. Most of the local people go to the nearest hospital at Paksong or to that in Champasak. Language is an issue for some minorities, who do not speak the Lao national language. There are only few people who run fishery business in this area and most of them do not see any adverse impacts

People from Ban Ta Yuk Seu, who will be relocating to the new focal point, prefer to have the existing road improved because it passes by their houses. Most of the people use public buses followed by motorcycles, bicycles and by foot as modes of transportation. The average travel times range from 1-3 hours to go to Pakse, Paksong or Attapur depending on village location, mode of transportation and season. In the rainy season it usually takes more time to go to other places due to flooding and muddy road conditions that only buses, trucks or private vehicles can navigate. People are also concerned about safety issues. They suggested that traffic signs and lights along the road should be provided. Since most of the villages still lack of the necessary infrastructure facilities e.g. water supply, electricity, communication services, they expect that with the road improvement project these social facilities would follow.

## APPENDIX - QUESTIONNAIRES

### Questionnaire Form for Socio- Economic Survey on the JICA Improvement of Roads in the Southern Region Study in Lao PDR

#### 1. Village Profile

Village's name:..... Village's age:.....  
Village's location:..... Village's Ethnic group:.....  
North border with:..... South border with:.....  
East border with:..... West border with:.....  
Village's area:.....

Location of next largest center:.....  
    Accessible in raining season:  easy                       difficult  
Location of nearest secondary school:.....  
    Accessible in raining season:  easy                       difficult  
Location of nearest medical school:.....  
    Accessible in raining season:  easy                       difficult  
Location of nearest hospital school:.....

#### Respondent Profile

Village's name:.....  
Name of respondent:.....  
Age:.....sex:.....married.....single:.....  
Professional:.....Ethnic group:.....Major group:.....  
Can speak Lao Loum:  Yes                       No  
Distance of house from road:.....

#### Areas of questioning

The following are the areas in which each respondent will be surveyed:

#### 2. Impressions on the proposed road project and transportation modes

2.1 Overall Impressions of proposed road improvement  
\*.....

\*.....

2.2 Why do you travel to the district center or nearest town?

Sell Agriculture production                       Sell Household need

Go to government office                       Go to hospital

Other



2.3 What do you usually buy?

- Food
- Household need
- Electric equipment
- Agriculture tools
- Other

2.4 How do you travel there?

- By foot
- Bicycle
- Public bus
- Boat
- Motorcycle
- Private vehicle

2.5 How long does a typical trip take?

.....

2.6 How often do you use existing road?

.....

**3. Perception on the existing and proposed road**

3.1 Are there any problems with the present road, particularly concerned about weather related issues? What are those problems?

- Yes
- No
- Why.....

3.2 Increased Access to Secondary School

In case your children are not presently going to secondary school, will your children go to schools or not if the road is constructed?

- Yes
- No
- Why.....

3.3 How will the proposed improved road assist you?

- Yes
  - Improve access to markets for produce
  - Increase access to secondary schools
  - Better access to medical care
  - Others
- No
- Why.....

**4. Fish Consumption and Production**

4.1 How often does your family eat fish in a week?

.....

4.2 Do you manage a small-scale fishery business?

Yes  No

4.3 Are you aware of how many such businesses are there in your community?

Yes  No

If yes, How many.....

4.4 Will the proposed road improvements affect fish production

Yes  No

Why.....

**5. Residents' Perceptions of Environmental issues**

5.1 Do you feel that the quality of your community's natural environment is generally acceptable?

Yes  No

Why.....

5.2 Do you feel that the proposed road improvements will improve/degrade the quality of the environment?

Positive Impact  Negative

Why.....

.....  
.....

**6. Villagers' Perception of Quality of Infrastructure.**

**6.1 Water quality and supply**

Are you generally satisfied with the quality of water using in your community?

Yes  No

Why and what do you want to improve? .....

.....

**6.2 Solid Waste Management**

Are you generally satisfied with the quality of solid waste management in your community?

Yes  No

Why and what do you want to improve? .....

.....

6.3 **Sewage Management**

Are you generally satisfied with the quality of sewerage in your community?

Yes  No

Why and what do you want to improve? .....

**7. Villagers' Awareness of Archeological Objects**

7.1 Are you aware of archeological objects being discovered in your area?

Know  Do not know

7.2 Are you aware of places where these objects may be located?

Know  Do not know

If yes where its location:.....

**8. Awareness and concerns Regarding Gender Issues**

8.1 Will the improved road make things better for girls and women in the village?

Yes  No

Why.....

**9. Impact of the road Improvements specifically on the various Minority Groups**

9.1 Will the improved road have a negative/ positive impact on the lifestyle and spiritual traditions of your community?

Yes  No

Why.....

**10. To be asked the people on missing link**

10.1 From your perspective which route will be the best road to meet your needs:

- Riverside route
- Route at the foot of mountain
- A route that runs through the middle of paddy field

10.2 Road Improvement

- Do you want to improve existing road to create the activities
- Do you want to have a new cutting road to create the activities

10.3 Overall Concluding Comment

**ANNEX F-9**

**WATER QUALITY SURVEY RESULTS**

## ANNEX F-9

### WATER QUALITY SURVEY RESULTS



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### PHOTOS

## **1. INTRODUCTION**

The water quality survey was carried out for the Study on Improvement of Roads in the Southern Region in Lao PDR funded by JICA with the Ministry of Communication, Transportation, Post and Construction (MCTPC) as National Executing Agency. The selection of the Water quality location is based on the meeting held with Mr. Yoshiki MIYASAKI, Project Manager of the JICA study Team in Pakse on 15 May 2002 . The water quality survey has to be carried for six sites for the Study on Improvement of Roads in the Southern Region in Lao PDR as shown in ANNEX in **Figure 1.1, Figure 1.2 and Figure 1.3.**

### **1.1 LOCATION**

In according with the meeting as above-mentioned, the following locations have been identified for water quality survey

(a) Road No. 14 a (i)

- (1) Houay Sahoua at Ban Vatluang Kao
- (2) Houay Praban at Ban Sikeut
- (3) Houay Sai at Ban Vatsai
- (4) Houay Khonken at Ban Khonken

(b) Road No. 16 A

- (5) Houay Mak Chanh at Nikhom 34 (Paksong)
- (6) Xe Nam Noy at Xe Nam Noy Bridge

The Frequency of the survey has to be undertaken in to two periods for dry season and wet season by taking samples and their analysis: The first samples should be collected during the first week of May 2002 and the second samples should be done during the first week of August 2002.

This report includes only the results and analysis of the water quality samples collected during the dry season in May.

## **2. SCOPE OF WORK**

The water quality survey task will require the collection of baseline information on the river surface water and the ground water crossing Route 14 a(i) and Route 16A in the southern region of Lao PDR. The collection and analysis of following parameters are required for the study:

- pH
- Conductivity
- TDS
- DO
- BOD
- COD
- Phosphate
- Nitrate
- Turbidity
- Permanganate Value
- Total Coliforms
- Presumptive E-Coli
- Alkalinity
- Iron
- Manganese
- Copper.

The survey methodology should meet the requirements of relevant laws, decrees, guidelines, and Water Quality

### **3. MODALITIES OF IMPLEMENTATION**

Prior to the survey, a brief meeting was held at the headman's office in Champassak village to discuss key issues pertaining to the collection of samples in this area, particularly in the Houay Khone ken and Hoauy Sai which is located at about 8 km upstream of Mekong ferry boat, Champassak district. The road condition to the mentioned streams is not accessible during the wet season.

During the field survey it has been found that for the collection of water quality samples, the river flows of some streams such as Houay Praban, Houa Sahoua, Houa Khonekene and Houay Sai are not sufficiently accurate to the adopted within the scope of the survey, because it has no water in the streams during the dry season. The water collected from the sites at present is most likely to be left over from the rain few days before we arrived.

For the sake of reference for the project study, **six** (6) bottles of samples were taken by hand from the river located crossing the road 14 a (i) and 16A. The measurement of pH and Conductivity parameters was also carried out on site using a meter type T.P.S Model WP-81 –Conductivity-Salinity pH-Temp.(Australia).

The sample collected of one liter per one site was sent by air within 24 hours to Vientiane by plastic bottle and analyzed by the Laboratory of water quality analysis of the Department of Irrigation under the Ministry of Agriculture and Forestry. The detailed test results of analysis are given in **Table 1.1-Table 1.6** attached.



#### **4. RECOMMENDATION**

An additional collection of water quality sample at Houay Katamtok (downstream of Houay Ho dam) crossing road 16A at Houay Katamtok Bridge requires to be carried out during the next survey in August 2002.

# **ANNEXES**

# **FIGURES**

**SITE LOCATIONS OF WATER QUALITY SURVEY**

# STUDY ON IMPROVEMENT OF ROADS IN THE SOUTHERN REGION IN LAO PDR

## WATER QUALITY SURVEY

Site location Road No. 16 A  
Xe Namnoy Bridge

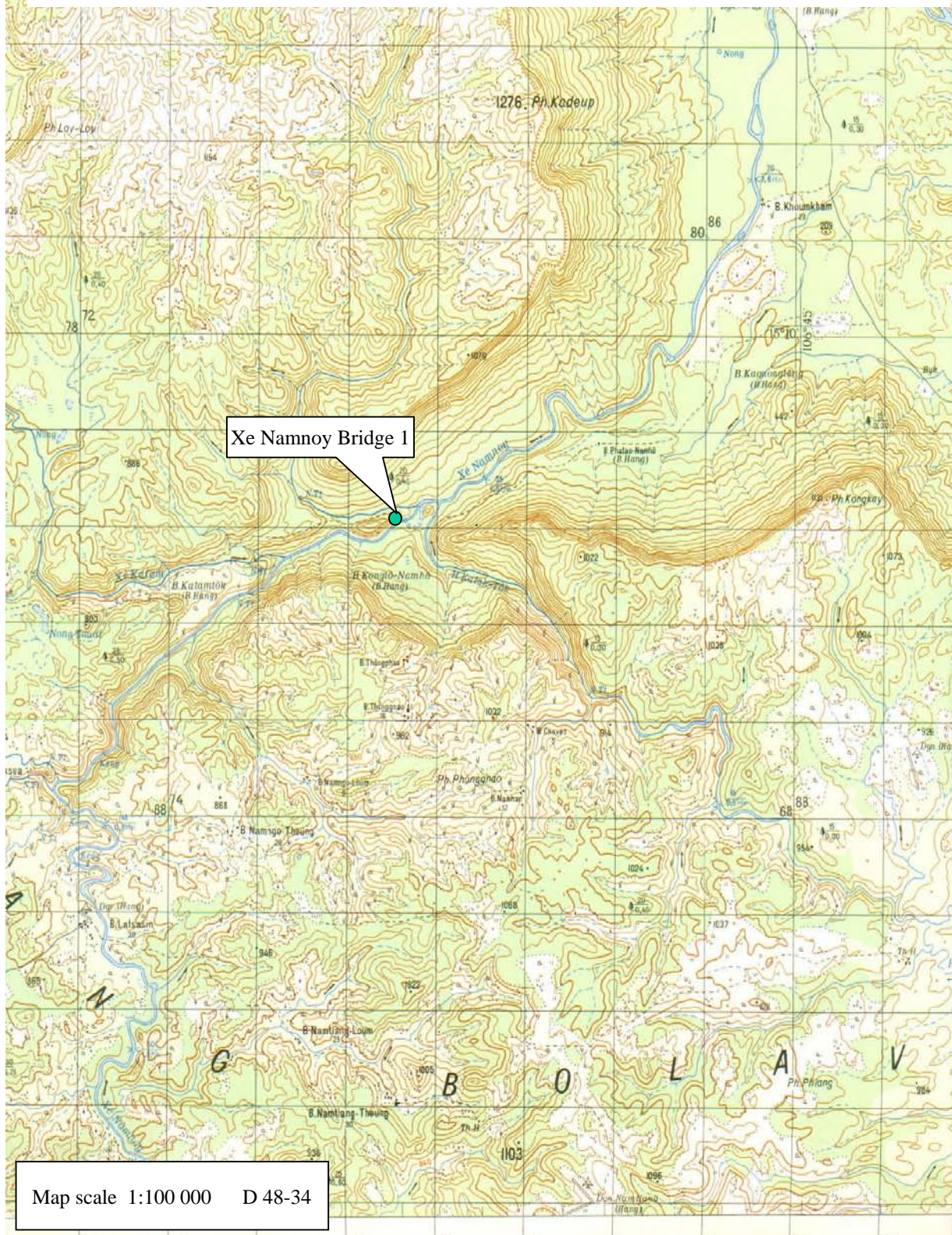


FIGURE 1.1



# STUDY ON IMPROVEMENT OF ROADS IN THE SOUTHERN REGION IN LAO PDR

## WATER QUALITY SURVEY

### Site location, Road No. 16 A – Houay Makchanh Gnai

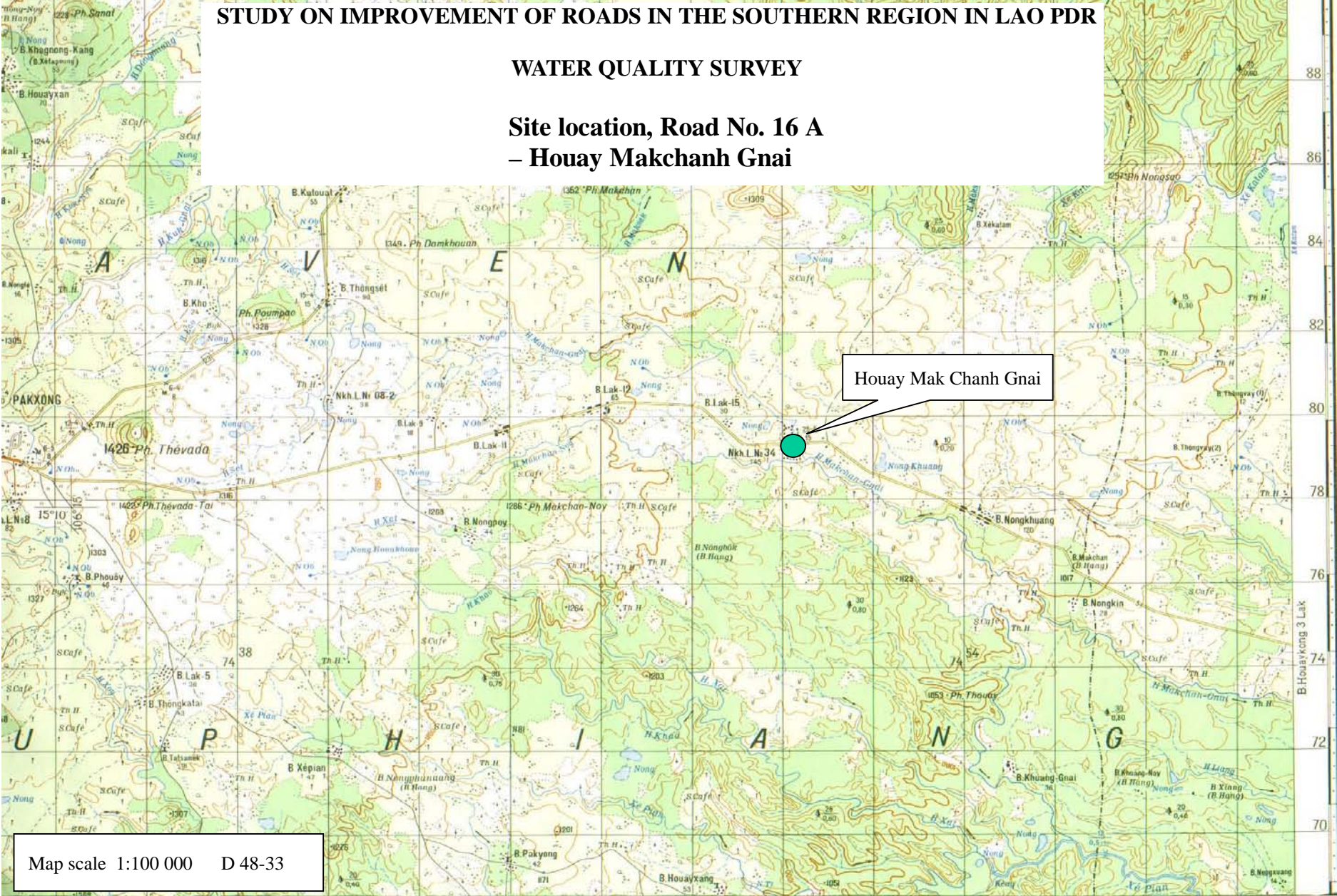


FIGURE 1.2

Map scale 1:100 000 D 48-33





**FIGURE 1.3**

# **TABLES**

**Result of Water Quality Analysis**

### SUMMARY OF RESULT OF WATER QUALITY ANALYSIS

| No. | Parameters                       | Unit            | H. Praban | H. Sahoua | H.Sai | H. Khonken | H. Mak Chanh Gnai | Xe Nam Noy |
|-----|----------------------------------|-----------------|-----------|-----------|-------|------------|-------------------|------------|
|     |                                  |                 | 1         | 2         | 3     | 4          | 5                 | 6          |
|     | <b>Arrival date</b>              |                 | 17-May-02 |           |       |            | 19-May-02         |            |
| 1   | pH                               |                 | 7.35      | 7.62      | 7.75  | 7.41       | 7.82              | 7.83       |
| 2   | Conductivity                     | mS/m            | 15.1      | 15.6      | 6.57  | 21.2       | 5.51              | 3.45       |
| 3   | TDS                              | mg/l            | 75        | 78        | 33    | 106        | 27                | 17         |
| 4   | Turbidity                        | NTU             | 23        | 475       | 293   | 5100       | 5.5               | 7.5        |
| 5   | Alkalinity, as CaCO <sub>3</sub> | mg/l            | 62.8      | 57.5      | 33.05 | 48.9       | 31.4              | 25.3       |
| 6   | CODMn                            | mg/l            | 6.227     | 16.22     | 4.095 | 14.35      | 2.303             | 2.708      |
| 7   | BOD5                             | mg/l            | 2.112     | 5.017     | 1.537 | 4.52       | 0.839             | 0.934      |
| 8   | DO                               | mg/l            | 6.314     | 6.63      | 6.799 | 5.678      | 6.624             | 6.966      |
| 9   | Total Coliform                   | colonies /100ml | 0         | 0         | 0     | 0          | 320               | 60         |
| 10  | Nitrate (NO <sub>3</sub> -N)     | mg/l            | 0.021     | 0.018     | 0.017 | 1.9        | 0.026             | 0.018      |
| 11  | PO <sub>4</sub> -P               | mg/l            | 0.0081    | 0.085     | 0.559 | 0.495      | 0.019             | 0.013      |
| 12  | KMnO <sub>4</sub> Value          | mg/l            | 24.6      | 64.1      | 19.6  | 56.7       | 9.1               | 10.7       |
| 13  | Presumptive E-Coli               | colonies /100ml | 10        | 22        | 60    | 5          | 39                | 12         |
| 14  | Iron (Fe)                        | mg/l            | 0.027     | 1.91      | 0.93  | 2.915      | 0.038             | 0.032      |
| 15  | Cu                               | mg/l            | 0.017     | 0.027     | 0.023 | 0.028      | 0.019             | 0.021      |
| 16  | Mn                               | mg/l            | < 0.001   | 0.342     | 0.027 | 0.004      | < 0.001           | 0.012      |

Laboratory of Water Quality Analysis  
Chief of WQA

Mr Bounsouk



Lao People's Democratic Republic  
Peace Independence Democracy Unity and Prosperity

Department of irrigation  
Irrigation Survey Design Center  
Laboratory of Water Quality Analysis

**No. 025/WQA**  
Vientiane, 22 May 2002

**RESULT OF WATER QUALITY ANALYSIS**

**Name of river/stream/pond:** Houay Prabang  
**Location:** at Ban Sikeut, Champassak District

| No. | Parameters                       | Unit           | Houay Prabang | Remark   |
|-----|----------------------------------|----------------|---------------|----------|
|     | <b>Arrival date</b>              |                | 17-May-02     |          |
| 1   | pH                               |                | 7.35          | Sunshine |
| 2   | Conductivity                     | mS/m           | 15.1          |          |
| 3   | TDS                              | mg/l           | 75            |          |
| 4   | Turbidity                        | NTU            | 23            |          |
| 5   | Alkalinity, as CaCO <sub>3</sub> | mg/l           | 62.8          |          |
| 6   | CODMn                            | mg/l           | 6.227         |          |
| 7   | BOD <sub>5</sub>                 | mg/l           | 2.112         |          |
| 8   | DO                               | mg/l           | 6.314         |          |
| 9   | Total Coliform                   | colonies/100ml | 0             |          |
| 10  | Nitrate (NO <sub>3</sub> -N)     | mg/l           | 0.021         |          |
| 11  | PO <sub>4</sub> -P               | mg/l           | 0.0081        |          |
| 12  | KMnO <sub>4</sub> Value          | mg/l           | 24.6          |          |
| 13  | Presumptive E-Coli               | colonies/100ml | 10            |          |
| 14  | Iron (Fe)                        | mg/l           | 0.027         |          |
| 15  | Cu                               | mg/l           | 0.017         |          |
| 16  | Mn                               | mg/l           | < 0.001       |          |

Laboratory of Water quality Analysis  
Approved by : Mr Bounsouk

Mr Bounsouk

Lao People's Democratic Republic  
Peace Independence Democracy Unity and Prosperity

Department of irrigation  
Irrigation Survey Design Center  
Laboratory of Water Quality Analysis

**No. 026/WQA**  
Vientiane, 22 May 2002

**RESULT OF WATER QUALITY ANALYSIS**

Name of river/stream/pond: Houay Sahoua  
Location: at Ban Vatluang Kao Champassak District

| No. | Parameters                       | Unit           | H. Sahoua | Remark   |
|-----|----------------------------------|----------------|-----------|----------|
|     | Arrival date                     |                | 17-May-02 |          |
| 1   | pH                               |                | 7.62      | Sunshine |
| 2   | Conductivity                     | mS/m           | 15.6      |          |
| 3   | TDS                              | mg/l           | 78        |          |
| 4   | Turbidity                        | NTU            | 475       |          |
| 5   | Alkalinity, as CaCO <sub>3</sub> | mg/l           | 57.5      |          |
| 6   | CODMn                            | mg/l           | 16.22     |          |
| 7   | BOD <sub>5</sub>                 | mg/l           | 5.017     |          |
| 8   | DO                               | mg/l           | 6.63      |          |
| 9   | Total Coliform                   | colonies/100ml | 0         |          |
| 10  | Nitrate (NO <sub>3</sub> -N)     | mg/l           | 0.018     |          |
| 11  | PO <sub>4</sub> -P               | mg/l           | 0.085     |          |
| 12  | KMnO <sub>4</sub> Value          | mg/l           | 64.1      |          |
| 13  | Presumptive E-Coli               | colonies/100ml | 22        |          |
| 14  | Iron (Fe)                        | mg/l           | 1.91      |          |
| 15  | Cu                               | mg/l           | 0.027     |          |
| 16  | Mn                               | mg/l           | 0.342     |          |

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**No. 027/WQA**  
Vientiane, 22 May 2002

**RESULT OF WATER QUALITY ANALYSIS**

Name of river/stream/pond: Houay Sai  
Location: at Ban Vatsai, Champassak District

| No. | Parameters                       | Unit           | H.Sai     | Remark       |
|-----|----------------------------------|----------------|-----------|--------------|
|     | Arrival date                     |                | 17-May-02 |              |
| 1   | pH                               |                | 7.75      | Rain, Cloudy |
| 2   | Conductivity                     | mS/m           | 6.57      |              |
| 3   | TDS                              | mg/l           | 33        |              |
| 4   | Turbidity                        | NTU            | 293       |              |
| 5   | Alkalinity, as CaCO <sub>3</sub> | mg/l           | 33.05     |              |
| 6   | CODMn                            | mg/l           | 4.095     |              |
| 7   | BOD <sub>5</sub>                 | mg/l           | 1.537     |              |
| 8   | DO                               | mg/l           | 6.799     |              |
| 9   | Total Coliform                   | colonies/100ml | 0         |              |
| 10  | Nitrate (NO <sub>3</sub> -N)     | mg/l           | 0.017     |              |
| 11  | PO <sub>4</sub> -P               | mg/l           | 0.559     |              |
| 12  | KMnO <sub>4</sub> Value          | mg/l           | 19.6      |              |
| 13  | Presumptive E-Coli               | colonies/100ml | 60        |              |
| 14  | Iron (Fe)                        | mg/l           | 0.93      |              |
| 15  | Cu                               | mg/l           | 0.023     |              |
| 16  | Mn                               | mg/l           | 0.027     |              |

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**No. 028/WQA**  
Vientiane, 22 May 2002

**RESULT OF WATER QUALITY ANALYSIS**

Name of river/stream/pond: Houay Khonken  
Location: at Ban Khoneken, Champassak District

| No. | Parameters                       | Unit           | H. Khonken | Remark        |
|-----|----------------------------------|----------------|------------|---------------|
|     | Arrival date                     |                | 17-May-02  |               |
| 1   | pH                               |                | 7.41       | Cloudy, rainy |
| 2   | Conductivity                     | mS/m           | 21.2       |               |
| 3   | TDS                              | mg/l           | 106        |               |
| 4   | Turbidity                        | NTU            | 5100       |               |
| 5   | Alkalinity, as CaCO <sub>3</sub> | mg/l           | 48.9       |               |
| 6   | CODMn                            | mg/l           | 14.35      |               |
| 7   | BOD <sub>5</sub>                 | mg/l           | 4.52       |               |
| 8   | DO                               | mg/l           | 5.678      |               |
| 9   | Total Coliform                   | colonies/100ml | 0          |               |
| 10  | Nitrate (NO <sub>3</sub> -N)     | mg/l           | 1.9        |               |
| 11  | PO <sub>4</sub> -P               | mg/l           | 0.495      |               |
| 12  | KMnO <sub>4</sub> Value          | mg/l           | 56.7       |               |
| 13  | Presumptive E-Coli               | colonies/100ml | 5          |               |
| 14  | Iron (Fe)                        | mg/l           | 2.915      |               |
| 15  | Cu                               | mg/l           | 0.028      |               |
| 16  | Mn                               | mg/l           | 0.004      |               |

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No. 029/WQA  
Vientiane, 22 May 2002

**RESULT OF WATER QUALITY ANALYSIS**

Name of river/stream/pond: Houay Mak Chanh Gnai  
Location: at Ban Nikhom 35, Paksong District

| No. | Parameters                       | Unit           | H. Mak Chanh Gnai | Remark   |
|-----|----------------------------------|----------------|-------------------|----------|
|     | Arrival date                     |                | 19-May-02         |          |
| 1   | pH                               |                | 7.82              | Sunshine |
| 2   | Conductivity                     | mS/m           | 5.51              |          |
| 3   | TDS                              | mg/l           | 27                |          |
| 4   | Turbidity                        | NTU            | 5.5               |          |
| 5   | Alkalinity, as CaCO <sub>3</sub> | mg/l           | 31.4              |          |
| 6   | CODMn                            | mg/l           | 2.303             |          |
| 7   | BOD <sub>5</sub>                 | mg/l           | 0.839             |          |
| 8   | DO                               | mg/l           | 6.624             |          |
| 9   | Total Coliform                   | colonies/100ml | 320               |          |
| 10  | Nitrate (NO <sub>3</sub> -N)     | mg/l           | 0.026             |          |
| 11  | PO <sub>4</sub> -P               | mg/l           | 0.019             |          |
| 12  | KMnO <sub>4</sub> Value          | mg/l           | 9.1               |          |
| 13  | Presumptive E-Coli               | colonies/100ml | 39                |          |
| 14  | Iron (Fe)                        | mg/l           | 0.038             |          |
| 15  | Cu                               | mg/l           | 0.019             |          |
| 16  | Mn                               | mg/l           | < 0.001           |          |

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**No. 030/WQA**  
Vientiane, 22 May 2002

**RESULT OF WATER QUALITY ANALYSIS**

Name of river/stream/pond: Xe Namnoy  
Location: at Xe Namnoy Bridge, Paksong District

| No. | Parameters                       | Unit           | Xe Nam Noy | Remark   |
|-----|----------------------------------|----------------|------------|----------|
|     | Arrival date                     |                | 19-May-02  |          |
| 1   | pH                               |                | 7.83       | Sunshine |
| 2   | Conductivity                     | mS/m           | 3.45       |          |
| 3   | TDS                              | mg/l           | 17         |          |
| 4   | Turbidity                        | NTU            | 7.5        |          |
| 5   | Alkalinity, as CaCO <sub>3</sub> | mg/l           | 25.3       |          |
| 6   | CODMn                            | mg/l           | 2.708      |          |
| 7   | BOD <sub>5</sub>                 | mg/l           | 0.934      |          |
| 8   | DO                               | mg/l           | 6.966      |          |
| 9   | Total Coliform                   | colonies/100ml | 60         |          |
| 10  | Nitrate (NO <sub>3</sub> -N)     | mg/l           | 0.018      |          |
| 11  | PO <sub>4</sub> -P               | mg/l           | 0.013      |          |
| 12  | KMnO <sub>4</sub> Value          | mg/l           | 10.7       |          |
| 13  | Presumptive E-Coli               | colonies/100ml | 12         |          |
| 14  | Iron (Fe)                        | mg/l           | 0.032      |          |
| 15  | Cu                               | mg/l           | 0.021      |          |
| 16  | Mn                               | mg/l           | 0.012      |          |

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**No. 031/WQA**  
Vientiane, 22 May 2002

**RESULT OF WATER QUALITY ANALYSIS**

Name of river/stream/pond: Xe Namnoy II  
Location: at Xe Namnoy Bridge, Paksong District

| No. | Parameters                       | Unit           | Xe Nam Noy | Remark   |
|-----|----------------------------------|----------------|------------|----------|
|     | Arrival date                     |                | 19-May-02  | Sunshine |
| 1   | pH                               |                |            |          |
| 2   | Conductivity                     | mS/m           | 7.07       |          |
| 3   | TDS                              | mg/l           | 39.5       |          |
| 4   | Turbidity                        | NTU            | 197        |          |
| 5   | Alkalinity, as CaCO <sub>3</sub> | mg/l           | 15         |          |
| 6   | CODMn                            | mg/l           | 221        |          |
| 7   | BOD5                             | mg/l           | 3.38       |          |
| 8   | DO                               | mg/l           | 1.12       |          |
| 9   | Total Coliform                   | colonies/100ml | 6.84       |          |
| 10  | Nitrate (NO <sub>3</sub> -N)     | mg/l           | 0          |          |
| 11  | PO <sub>4</sub> -P               | mg/l           | 0.005      |          |
| 12  | KMnO <sub>4</sub> Value          | mg/l           | 0.019      |          |
| 13  | Presumptive E-Coli               | colonies/100ml | 18         |          |
| 14  | Iron (Fe)                        | mg/l           |            |          |
| 15  | Cu                               | mg/l           | 0.032      |          |
| 16  | Manganese (Mn)                   | mg/l           | 0.023      |          |
|     |                                  |                | 0.123      |          |

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PHOTOS





**Photo 1**  
Collection of water quality sample  
at Houay Prabang



**Photo 2**  
Collection of Water quality sample  
and pH measurement at Houay  
Sahoua



**Photo 3**  
Collection of water quality sample  
and pH measurement at Houay Sai

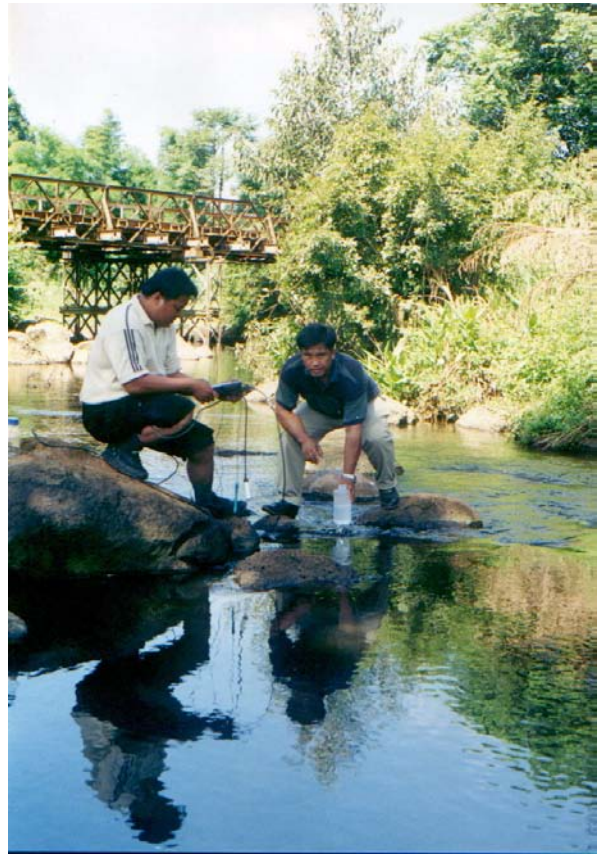


**Photo 4**  
Collection of water quality sample  
and pH measurement at Xe Namnoy Bridge





**Photo 5**  
Collection of water quality sample  
at Houay Khone ken



**Photo 6**  
Collection of water quality sample and  
pH measurement at Houay Mak Chanh Gnai