

# Environment and Social Monitoring Report

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Monthly Progress Report  
May-December 2006 (4/4)

## LAO PDR: GMS Nam Theun 2 Hydroelectric Project

Prepared by the Environment and Social Division of Nam Theun 2 Power Company, Ltd.

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**Nam Theun 2 Power Company Ltd.**

**Nam Theun 2 Hydro-Electric Project**

**Monthly Progress Report  
covering activities in November 2006**

**Part C : Environmental & Social Report**

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## **General Overview**

# 1 General Overview

## ***Project lands:***

- Implementation of the livelihood restoration programs continued. Infrastructure development related to frog, mushroom and pig raising commenced.
- Relocation of the drinking water factory within LPA 26a was completed in November which allowed handover of the additional land to the HC.
- Mechanical clearing of stumps and other debris was completed on the 44ha plot of land in Gnommalat during November. Arrangements for land distribution to PAPs are expected to be finalized in January 2007.
- Construction of 5 replacement houses in Oudomsouk commenced.

## ***Public Health:***

- Construction work in all remaining infrastructure buildings is in progress (details below).
- Boreholes for GMLT District Hospital and Kengdaeng, Khedphit, Nasok and Nadou Health Centers have been completed. Water pumps installation is scheduled for December 2006.
- Ambulance for Khammouane Provincial Hospital was handed over to the Provincial Health Officer on November 2006.
- Medical equipment distributed to all health facilities on November 2006. Only X-Ray Unit for GMLT DH is pending and is due to arrive in January 2007.
- Number of training courses were held during the month:
  - Emergency medicine training continues for Khamkeut in Vientiane – completion December 2006.
  - A day training program was conducted for staff for health checks and survey in Bouama and Phonsavang Villages
  - Peer education training on STI was conducted for youth group in GMLT District
  - STI treatment training for private pharmacies in Mahaxai District.
- Preparation was made for World AIDS Day program by all five districts and staff of NTPC and partners.
- 2007 calendar as an educational material was designed and prepared during the month. Sent for printing and likely to be ready by mid-December 2006.
- Suspected typhoid outbreak investigation was carried out in GMLT and Nakai. Further discussion will be held with Provincial Health on future management on this problem.
- HPMU staff provided variable levels of supervision and training to health center staff in different locations during monthly Maternal and Child Health clinics.
- Health checks and survey conducted in Bouama and Phonsavang Villages on November 2006
- Preparation for training of traditional healers is in progress with Traditional Medical Research team, to be held in December 2006.
- Institut Pasteur (IP) President and Vice-President along with Health Minister and his team visited Nakai District. Discussions were held on collaborative program of monitoring health of resettlers with IP
- The RMU Director organized a meeting with HPMU and RMU staff working in health. This meeting will be conducted regularly at monthly intervals.
- Routine monthly meetings were held in the province and the four districts
- Routine visits to the resettlement villages continued and population health monitored

***Nakai Plateau resettlement******Infrastructure:***

- Extra topographic survey and mapping: The works in the contracts for the extra survey and mapping required at Area 13 for the Ban Thalang, Oudomsouk and at Areas 1 and 2 were completed.
- UXO search and clearance: The contractor has maintained good progress during the month and completed Area 15 agriculture and house areas and is now working in the Area 13 agriculture area. From November 2005 to date the contractor has found and destroyed, in the resettlement areas, 1,709 UXO items, including 927 bomblets. There is an ongoing contract for UXO community awareness and on-call roving response teams with the contractor. By the end of November the roving unit have found and disposed of further 1,793 UXO items including 1,616 bomblets. The communications channels between villagers and the response team continue to work very well, with any finds of suspicious items in community areas being quickly reported.
- Timber houses: The construction of timber houses in Area 16 (Pilot Village) for 8 families resettling from Ban Keng Gnao is completed. The contractors awarded the timber houses construction contracts at areas 17 Bouama, 18 Phonsavang and 19 Sop On have continued with the construction works and 220 houses are under construction. The contractor for the northern villages of Sop Ma and Sop Hia has been given notice to start work on 30 October. The two contracts for the northern villages of Nong Boua Kham and Sop Phene have not yet started due to necessary additional preparation works on the site (site clearance, access etc.) and VFA timber supply problems
- Roads and tracks: There are now four road construction contracts underway. The three southern VG1 road and track contract is about 87% complete. The Southern Resettlement Road contract is about 66% complete. The four northern resettlement area access roads and track contract is about 80% complete. The two southern VG2 contract is about 7% complete.
- Irrigation: The construction of the irrigation area extension at the Pilot Village for the Keng Gnao resettlers will restarted in November.
- Villages Layout: The preparation of preliminary resettlement village and agricultural layouts for the VG2 villages is continuing by NTPC personnel in consultation with villagers.
- Community Buildings: The bidding documents for the construction of community buildings have been delayed as there has not been a letter of no objection received from the Bank.

Domestic Water Supply and Sanitation : The boreholes drilling program has continued as per schedule and a total of 12 new productive wells were completed in the villages of Ban Done (area 21), Ban Bouama (area 17), Ban Khone Kaen (area 22 and Ban Nongboua (Pilot Village area 16). In addition 4 new productive boreholes have been completed in the Gnommalat district hospital and the Nadou, Khed Phid and Nasok health Centers. With regard to project land interventions, 1 new successful borehole was drilled in Oudomsouk May (ex new urban area A) for the benefit of 5 additional families and 1 borehole was drilled in Gnommalat new 8 houses. To date, 121 deep productive boreholes have been successfully drilled and developed on a total of 133 tentatives. All included, the total failure rate is of about 9%. Sixty six (66) wells are equipped with water lifting devices.

- Electricity: The design of the resettlement village electrification systems is underway and complete for five villages

***Livelihood Plans:***

- Third mission of livelihood advisor cancelled.
- Reorganization on-going.

***Forestry:***

- Production at 3 sawmill improved but achievement of sawn wood production target difficult.

***Agriculture / Livestock:***

- The 2 technical Assistants have released. a technical program from November 2006 to June 2007 and an Agriculture and Livestock implementation schedule for each village up to June 2007

- Training sessions for the staff done during the month

#### Fisheries:

- The contract for the Implementation plan of Nakai Plateau reservoir management and fisheries has been delayed until early December.

#### Community Development:

- Beside routine activities like rice and protein supports, children food support (part of education program), nursery equipment was sent to Ban Done and Khone Kaen villages which are the last two villages moved last July 2006.
- Nakai Tai / Nakai Neua village layout final consultations were held and villagers finally agreed with the layouts. NTPC Infrastructure Team can go ahead with final design and bids for house and community buildings construction. Thalang Agricultural layout and plots were also adopted by the villagers. The remaining villages are Sop Hia/ Nam Nian to make final decisions whether to join the resettlement program in Nakai plateau (area 7), although they proposed to come and visit new area (Pung phai) along the road to Yalong (near Thalang) and they refused to come.
- The main activities at this stage for CD Team are to organize villagers to transport their old house materials to new site. Ka Oy villagers will be supported to relocate to new Sop On and Ban Done as agreed during previous consultations. Though consultation with villagers, Kaoy villagers will start preparation to move to new Sop On and Ban Done starting December 2006 and expected to be completed by February-March 2007. The next villages to be urgently relocated are remaining Sop Hia/ Nam Nian (waiting to be confirmed by GoL Team) and Nongbouakham. These villages will be subjected to flood due to main Nakai dam completion.
- CD staff (3 from SRO, 4 from DWG) attended training on credit/ saving fund in Louangphrabang, expecting to adapt some lessons in Nakai resettlement villages very soon as a continuous process from what has been done so far (in order to upgrade the support to village credit and saving system).

#### **Downstream Program:**

- Work continued to develop livelihood restoration activities, including development of village organizations, village revolving and savings funds, and demonstration farms within the selected pilot villages.
- Work continued to finalize employment contracts for additional staff, as noted in previous monthly progress reports. Most of the new staff members will commence work during January 2007.
- A revised version of the Downstream Restoration Program documentation was prepared and posted on the secure website early November.

#### **Environment:**

- Water Quality sampling (7-11 November 2006) and analysis.
- Ongoing Interim Human Elephant Conflict (HEC) Monitoring and continued contractual activities for Elephant Program Phase II.
- Received the Inception Report for the Wildlife Management and Monitoring Program.
- NTPC review of WCS bid documents for the environmental education component of the Transitional Strategy. .
- Development of the 2<sup>nd</sup> Quarterly Progress Report for the EMU.

#### **Monitoring:**

- IFIs mission from 21 to 25 November 2006



## 1.1 Staffing NTPC, GOL (EMU, RMU, DWG) and Partners

### ○ NTPC E&SD Staffing

Legend:

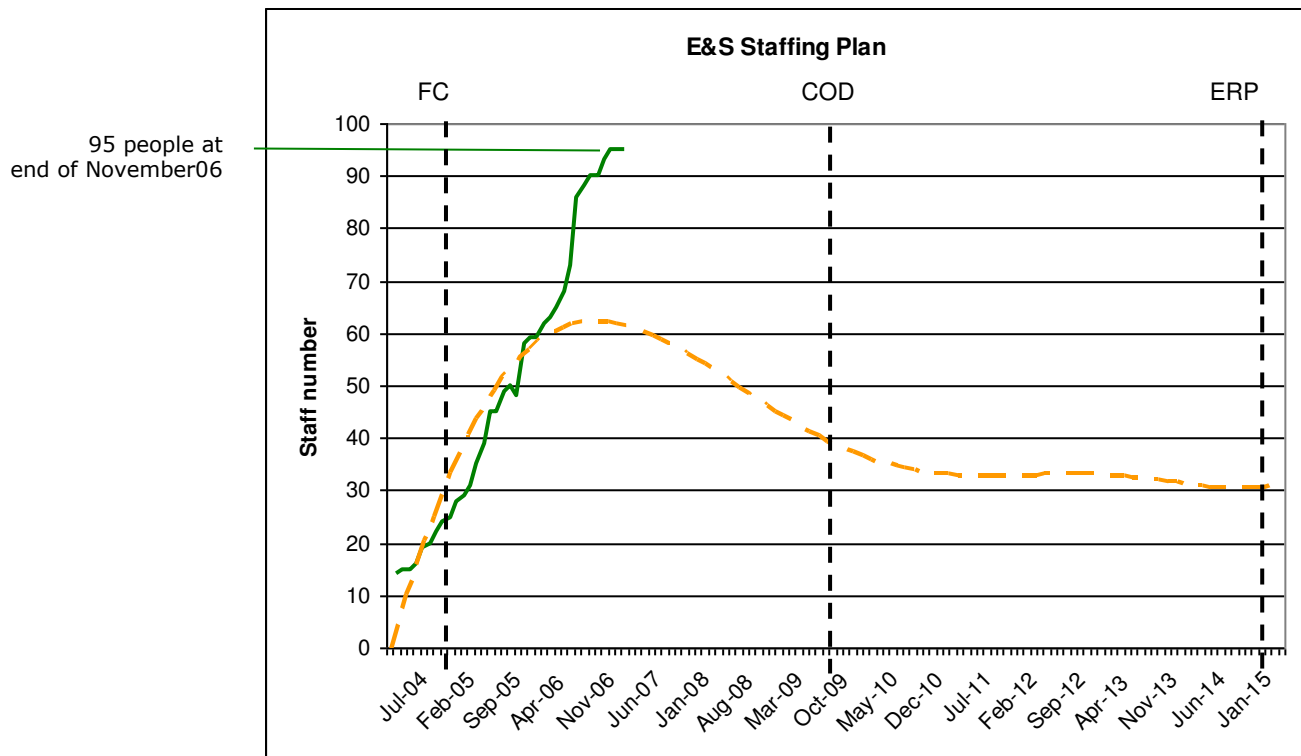
Scheduled staffing plan

Actual staff recruitment

FC = Financial Close

COD = Commercial Operation Date

ERP = End of Resettlement Period



In addition to NTPC staff, individual consultants are working full/part time with NTPC teams

The construction of the Nakai Residential Complex in Oudomsouk for use by the NTPC E&S team is on-going (complex of 54 rooms/studios/apartments and 6 villas).

### ○ EMU Staffing

No change from previous report.

### ○ RMU and DWG Staffing

No change from previous report.

### ○ Partners

No change from previous report.

## 1.2 Unanticipated Project Impacts

No change from previous report.

### 1.3 Additional Plans and PIP updating

- PIP / AIP

No change from previous report.

- Additional Plans

No change from previous report.

### 1.4 Grievance procedure

No new claims were received during the month of November on the Nakai Plateau. However, work was done to follow up on claims received prior to November.

The nine claims were received in Gnommalat District last month were reviewed. Three claims have already been resolved, with others pending further investigation.

Eight new claims were received in Gnommalat District during November.

### 1.5 Communication

No change from previous report.

### 1.6 Procurement

In November, procurement activities have been mainly, but not only focusing on:

- Public opening of the proposals for the construction of timber houses (VG2 and Project Lands) and start of the evaluation process,
- Opening of the technical proposals for the Independent Monitoring (Plateau) and preparation of the technical evaluation process handled by the GOL evaluation committee,
- Start of the Bidding process for the construction of kilns building,
- Search for suppliers for agriculture programme requirements,
- Negotiation and award of the contract for the update of the PIP,
- Negotiation and award of contracts for consultants for the Downstream programme,
- Bidding process for the installation of IT equipment of the Nakai complex (re-bidding necessary because of paucity of bidders)
- Opening and evaluation of the combined technical / financial proposal for the Elephant Program Phase 2;
- Approval of the Bidding documents by GOL for IMA Project Lands and submission to Care;
- Bidding process for the Community Buildings.

## **Social Activities**

**Physical Cultural Resources, Project Lands,  
Camp Followers**

## 2 Social Activities

### 2.1 Physical Cultural Resources, Project Lands, Camp Followers

#### 2.1.1 Physical and Cultural Surveys & Salvage

Based on the findings of the baseline PCR survey and the impact assessment advice provided by the HC, PCR were separated into four PCR plans: (i) movable PCR; (ii) PCR within construction areas; (iii) PCR within the Reservoir; and (iv) PCR along the Xe Bangfai.

##### **Movable PCR Plan**

To date, the Institute of Cultural Research (IoCR) has implemented this plan which consisted of a series of consultations and management measures. Management measures included (i) securing PCR (Buddha images) in situ; (ii) relocating PCR to the security of the temple; and (iii) improving security and awareness at the temples to help prevent theft.

No special remarks for this reporting period.

##### **PCR within Construction Areas Plan**

To date, the Department of Museums and Archaeology (DMA)/IoCR has implemented this plan which consisted of a series of consultations and management measures. Management measures included (i) appeasement ceremonies; (ii) relocation of PCR (cemeteries and stupas); and (iii) redesign of the Project to avoid impacts from construction.

Activities during November 2006 include:

- In response to a community grievance, on 18-20 November 2006 the IoCR conducted a consultation and an appeasement ceremony at Ban Phathoung for the impacts that quarry activities were having on their spirit sites (PCR/IN/42/1) located in caves on the western face of Phu Phathoung. The community was concerned that quarry activities were encroaching on the western face of Phu Phathoung. The HC/CC confirmed that the western face, and therefore the spirit sites, will not be directly impacted by quarrying activities and ITD are putting in place management measures to help prevent rock take and rock fall down the western face. IoCR disseminated this information and then conducted the requested appeasement ceremony for impacted to date.
- On 23-25 November 2006, the IoCR organized Buddhist ceremonies at Ban Oudomsouk temple to relocate several wooden stupa sites which were located at the rear of the temple. The custodians of the stupas were concerned at the proximity of construction activities for the Saddle Dam 12b drainage channel. Pre and post relocation Buddhist ceremonies were held, with a blessing in the temple for those persons who participated in the relocation. The stupas were moved to the eastern boundary of the temple grounds and away from any construction activity. The relocation ceremony followed on from relocation activities conducted in March 2006 when 23 concrete stupas were relocated from the western to eastern boundary of the temple grounds.

##### **PCR within the Reservoir Plan**

To date, IoCR has completed consultation for all resettlement villages and completed management measures for almost all VG1 PCR sites. Activities included (i) appeasement of spirit sites (ii) identification of new cemetery sites and UXO clearance prior to use; (iii) an appeasement ceremony for old cemetery sites; and (iv) ceremonies for the old temple sites prior to relocation of Buddha images.

Activities during November 2006 include:

- On 24 November 2006 the IoCR conducted a consultation at Ban Ka Oy to discuss the potential impacts that reservoir inundation will have on their PCR sites and identify mitigation or compensation measures which could be implemented to address any adverse impacts.
- The PCR plan for providing management measures for the remaining VG2 PCR sites is now complete and a contract has been drafted. Villages still requiring management measures include (i) Thalang; (ii) Nakai Tai; (iii) Nakai Neua; and (iv) Ka Oy. Activities will be implemented by IoCR and are scheduled to commence in December 2006 and continue until March 2007. Activities will include (i) appeasement ceremonies for spirit sites; (ii)

relocation ceremonies for temple sites; (iii) appeasement ceremonies for cemetery sites; and (iv) identification of new cemetery sites and UXO clearing.

### **PCR along the Xe Bangfai Plan**

The plan for PCR along the Xe Bangfai will be implemented in coordination with the Downstream Program. One historic site, five spirit sites and twelve temples are located on the banks. The temple sites were surveyed to prioritize monitoring effort and to identify any requirement for pre-operations management measures (relocation of infrastructure or bank protection).

Activities during November 2006 include:

- During the period of 30 October-16 November 2006, the DMA conducted an archaeological salvage of the historic kiln site which is located on the banks of the Xe Bangfai. Activities consisted of (i) consultation with Ban Mahaxai and Pova Neua; (ii) ceremony prior to archaeological salvage activities; (iii) survey and mapping of the banks to assess the number and distribution of the kilns; and (iv) conduct a detailed archaeological investigation of three of the best specimen kilns. Unfortunately, given the unconsolidated nature of the kiln walls, DMA were unable to transport two kilns back to Vientiane for display in the National Museum, Vientiane. DMA will submit a report detailing the archeological salvage activities which confirms that NTPC followed the correct procedure but, despite best efforts, no specimens were completely salvaged.

### **Chance Find PCR**

In addition to baseline PCR, there is potential for additional PCR (chance find PCR) to be identified during construction. DMA and IoCR are providing ongoing technical assistance to NTPC to deal with these chance find PCR as and when they are discovered.

Activities during November 2006 include:

- On 18-20 November 2006, IoCR followed up on a resubmission of a community grievance which was dated 23 July 2006. IoCR conducted another consultation at Ban Beunghouana Neua and Tai, the source of the original grievance. The villagers were satisfied with the appeasement ceremony which had been conducted on 16 August 2006 for disturbances to their territorial spirit site (*Phi Meuang*) and did not require any further ceremonies/compensation. The confusion seems to stem from within the District who were unaware of the appeasement ceremony and resubmitted the grievance dated 23 July 2006. The situation is now resolved.

### **PCR Monitoring**

On 15 November, the monthly PCR monitoring was undertaken by the EMO. The following table presents the villages and their PCR included in the PCR monitoring.

Village	PCR ID	PCR Type	Issue
Phonexai	PCR/ADJ/3/4	Temple	No issue
	PCR/IN/3/3	Cemetery	No issue
	PCR/IN/3/4	Stupa	No issue
Nam Thi	PCR/ADJ/3/3	Temple	No issue



*Appeasement ceremonies for the spirit sites at Phathoung Quarry*



*Pre-relocation Buddhist ceremony (top left & right), new location (bottom left), post-relocation Buddhist ceremony and communal meal (bottom right) for the wooden stupas at Ban Oudomsouk temple*





*Archaeological salvage activities for the historic kiln site on the Xe Bangfai*

## 2.1.2 Project Lands

### Main events in November:

- Implementation of the livelihood restoration programs continued. Infrastructure development related to frog, mushroom and pig raising commenced.
- Relocation of the drinking water factory within LPA 26a was completed in November which allowed handover of the additional land to the HC.
- Mechanical clearing of stumps and other debris was completed on the 44ha plot of land in Gnommalat during November. Arrangements for land distribution to PAPs are expected to be finalized in January 2007.
- Construction of 5 replacement houses in Oudomsouk commenced.

#### ○ Baseline Studies

The collection of baseline study data is complete.

#### ○ Meetings & Consultations

Weekly coordination meetings with the DCWG and RMU continued during the month of November 2006. Weekly meetings were held in Gnommalat District Office on every Friday morning to discuss progress of livelihood activities, obstacle clearance for Road 8B construction (Gnommalat town), and the coordination of GoL staff.

#### ○ Compensation

NTPC transferred the October compensation payment to RMU during November and payment commenced shortly thereafter. Due to the large volume of this payment and wide geographical area in which the PAPs who are included in this payment live, the payment process will not be completed until mid-December. These payments are detailed in the table below. After acquittal of this set of payments the next payment will be requested by RMU which can be distributed during January 2007.

In addition to the RMU-processed payment, there were two payments processed through Project Lands petty cash for November 2006. These payments were of high urgency to assist two families moving structures from LPA 38b. These payments were made on 14 November to support construction requirements for land to be accessible by 31 December 2006.

### Resettlement Actions Plans (RAPs):

During the month of November October revisions were made to RAP 2, 3 and RAP 5 in response to IFI comments.

### Oudomsouk Urban Planning Resettlement Action Plan:

The Contractor continued work on the construction of the 5 replacement houses in Oudomsouk. During November they were able to complete installation of the reinforced concrete columns, main structure and roof.

### Livelihood restoration

Livelihood restoration programs continued during November-October for PAPs whose livelihood is more than 10% affected by project activities. Contracts for implementation of the various programs have been completed and are currently being implemented. Developments to specific components of the livelihood restoration program during the month of November are described below.

***Rice Improvement:*** The rice improvement program started in May 2006, for 146 PAPs, in Gnommalat and Mahaxai Districts, out of the 160 farmers who participated at the training at



Thasano Rice Research Station between March 26<sup>th</sup> and April 4<sup>th</sup>. Preparations for the 2007 wet season rice program are now under way.

*Fish cultivation:* In November water was pumped from the Thathod irrigation scheme into some fish culture ponds due to falling ground water levels. At the end of November fish growth was measured to be 200 gram per fish.

*Rattan and bamboo:* Implementation continued.

*Orchid cultivation:* Implementation of the contract with the University of Laos for orchid development in Nakai and Gnommalat districts continued during the month of November, with initial activities being concentrated in Nakai District. The project aims to preserve the numerous existing species of orchids available in the Nam Theun 2 project area, as well as to assist interested farmers in understanding the possibilities for commercialization of orchid cultivation. Sample collection has been completed for Nakai.

*Vocational training:* No activity during the month of November-October.

*Forage and Livestock:* Two PAPs have chosen to plant fodder crops in the rice fields during the upcoming dry season to supplement feed material and to improve the soil fertility for wet season rice. Forage plots benefited from light rain showers in late October. Assessment of Additional application of water continued during November to support the dry season growth of the forage. Providing supplemental watering to the forages required deepening of some local wells. Payment was provided to PAPs to complete this work themselves. The performance of the different varieties of forage species has indicated that the soil conditions are less favorable than expected. Large livestock pen construction awaits further UXO clearance. Some cut-and-carry feeding has been demonstrated harvesting forage green matter from the more successful forage plots. The technique for bailing dried forage was demonstrated using simple technology and rice straw gathered after the wet season rice crop harvest. Fertilizer has been applied to the forage seedlings along with some watering. The response to fertilizer application was apparent within 2 weeks. Water supply is becoming more difficult to secure now as the dry season commences. Hand dug wells are being dug deeper to yield additional water.

*Frog & pig raising, mushroom cultivation:* Activities in association with the Non-Formal Education Development Centre of Laos continued for Mushroom house, pig pen and frog tank construction has proceeded following UXO clearance. A total of one frog tank, three pig pens, and six mushroom huts were completed. After concrete curing, 3 families have been provided with a breeding pair of pigs which they are now feeding inside the newly constructed new pens. These pigs have already been vaccinated. 10 PAPs have been selected and confirmed for mushroom activities, 18 PAPs for pig activities, and 5 PAPs for frog raising activities. Implementation of frog raising and mushroom production activities require that some small items of the infrastructure be completed before the practical training can commence.

*Horticulture:* Preparation for the horticulture portion of the livelihood restoration program continued in Nakai, Gnommalat and Mahaxai districts. Activities include soil preparation, installation of electrical services, and procuring materials.

*Replacement land:* Land clearing of the 44ha land development site was completed during November by TNT Company from Thakhek. Some piles of branches and uprooted tree stumps remain in the area. An SSEP is being prepared to allow the burning of this remaining waste material. Meanwhile, local villagers continue to collect firewood from these waste piles. Further land preparation activities are expected to commence in February 07. A land area of approximately 44 ha was identified near Gnommalat earlier this year for redistribution to PAPs which have lost their entire productive land holdings. Land allocation for the 27 PAPs was agreed to and documents were signed by all parties in May. Mechanical removal of stumps and other large debris began during the month of October. Following clearing, topographic surveys will be conducted. Clearing activities and land distribution was completed for the 2.2 ha plot of replacement land near the right bank of the downstream channel in Gnommalat. The original owners of this land will have one half of their original plot transferred back to them. Following discussions with PAPs and district officials, the remaining area will be distributed to approximately 80 PAPs from nearby villages. NTPC's ethnic minority consultant will return in December 2006 to help with consultations and negotiations with land distribution. All land provided to PAPs is expected to be finalized during January 2007 so that planning and land preparation for the 2007 wet season can commence.

### ○ Handover of lands to Head Contractor

#### *Access to land in LPA 26a*

The Dok Mai Pek drinking water factory experienced some difficulties moving and created a delay in providing handover of land to HC. Additional payment was made for the cost of removing the water sanitizing equipment and reinstalling at the new location. The additional money provided to the PAP allowed relocation to be completed by 23 Nov 2006.

### ○ Other

#### *Community Infrastructure*

Preparation of designs and BoQ for 41 concrete-lined shallow wells was completed for compiling the bidding documents required for NTSEP procedures. The contract is expected to be awarded in Jan 07.

The scheduled drilling of 7 boreholes in Gnommalat in December 2006 has been postponed until January 2007. These wells will be located in

1. GML Horticulture demonstration center
2. Ban Thong Mang
3. Ban Phone Lad Khouay
4. Ban Lao Na Ngam
5. Ban Sangkeo
6. Ban Gnommalat Neua
7. Ban Gnommalat Tai.

Locations #2-7 above will be equipped with a hand pumps (either TARA or AFRIDEV) and will be provided with plus spare parts. Location #1 will have a solar panel powered pump installed to satisfy the higher water demand by year round intensive horticultural production.

The proposal for Phase 1 of the further planning was done to determine the number and location of required improved water sources. A combination of deep boreholes with hand pumps and concrete-lined shallow wells will be employed.

Thathod irrigation development (which only includes work to be completed in the 2007 dry season) was discussed with district officials in detail. Further discussions will be held in December, with work expected to commence in early 2007 if the proposal is approved.

The Downstream Channel profile near the main Thathod irrigation canal intersection was surveyed to determine differences in elevation between Downstream Channel features, ground levels adjacent to the channel and the headworks of the Thathod irrigation scheme. Information from this survey will be used to determine the viability of several options for rehabilitation of the Thathod irrigation scheme

A contract was signed for undertaking repairs to the Ban Sangkeo school, construction of a footbridge over the Downstream Channel (pending HC non-objection), and construction of a meeting hall in Ban Sangkeo. Construction is expected to commence in early December. Prior to undertaking some parts of the school repair work, the HC must complete excavation of a drainage canal to alleviate wet season flooding of portions of the school yard caused by the nearby spoil disposal area.

#### *Replacement House Construction Gnommalat*

Bidding following the NTSEP process is ongoing for construction of 20 houses and one bathroom. Bid opening is scheduled for 5 December 2006. Evaluation will be complete during December and award of the contract is expected by January 2007. A variation order will be made immediately to this contract (C817) to include two additional houses for two households who have recently been impacted and are entitled to a replacement house. These 22 houses will be completed before the 2007 wet season. Currently there are 4 other houses which are involved in the relocation but will not receive a replacement house under C817.

#### *Relocation of structures within the transmission line corridor*

Discussions continued to finalize arrangement regarding relocation of houses and other structures within the transmission line corridor. It is anticipated that relocation will start in early January in sections 4 & 5 of the 500kV transmission line.

## Project Lands Photographs for the month of November 2006



Oudomsouk- House Construction, Nov 06



Gnommalat – Frog tanks



Gnommalat – Mushroom House



Gnommalat – Pig pen

**Camp Followers**

- Population Management: Monitoring of labor and population movement:

This activity is placed under direct control of RMU since January 2006.

- Human Trafficking Control

This activity is placed under direct control of RMU since January 2006.

- Infrastructure Development

No changes from previous report.

- Public Health

STIs and its control:

No changes from previous report.

- Traffic Safety and Regulations

Development of regulations / Review and strengthening of regulations: No changes from previous report.

Road Safety: No changes from previous report.

- Social Security and capacity building for local agencies

Support and technical assistance for District Police Offices:

Establish inter-sectoral Task Force on Population management and security: No changes from previous report

.

# **Social Activities**

## **Health Programs**

## 2.2 Public Health Regional and Resettlement Programs

Following major activities were undertaken during November 2006:

- Construction work in all remaining infrastructure buildings is in progress (details below).
- Boreholes for GMLT District Hospital and Kengdaeng, Khedphit, Nasok and Nadou Health Centers have been completed. Water pumps installation is scheduled for December 2006.
- Ambulance for Khammouane Provincial Hospital was handed over to the Provincial Health Officer on 28 November 2006.
- Medical equipment distributed to all health facilities on 28 November 2006. Only X-Ray Unit for GMLT DH is pending and is due to arrive in January 2007.
- Number of training courses were held during the month:
  - Emergency medicine training continues for Khamkeut in Vientiane – completion December 2006.
  - A day training program was conducted for staff for health checks and survey in Bouama and Phonsavang Villages
  - Peer education training on STI was conducted for youth group in GMLT District
  - STI treatment training for private pharmacies in Mahaxai District.
- Preparation was made for World AIDS Day program by all five districts and staff of NTPC and partners.
- 2007 calendar as an educational material was designed and prepared during the month. Sent for printing and likely to be ready by mid-December 2006.
- Suspected typhoid outbreak investigation was carried out in GMLT and Nakai. Further discussion will be held with Provincial Health on future management on this problem.
- HPMU staff provided variable levels of supervision and training to health center staff in different locations during monthly Maternal and Child Health clinics.
- Health checks and survey conducted in Bouama and Phonsavang Villages on 13-18 November 2006
- Preparation for training of traditional healers is in progress with Traditional Medical Research team, to be held in December 2006.
- Institut Pasteur (IP) President and Vice-President along with Health Minister and his team visited Nakai District. Discussions were held on collaborative program of monitoring health of resettlers with IP
- The RMU Director organized a meeting with HPMU and RMU staff working in health. This meeting will be conducted regularly at monthly intervals.
- Routine monthly meetings were held in the province and the four districts
- Routine visits to the resettlement villages continued and population health monitored

Abbreviations used in this section:

DCD	District Community Development
DH	District Hospital
DHO	District Health Office
HC	Health Center
HPMD	Health Properties Management Division
HPMU	Health Program Management Unit
ICHC	Integrated Community Health Center
IFMT	Institut Francophone pour la Medecine Tropicale
IP	Institut Pasteur
MCH	Maternal and Child Health
MOH	Ministry of Health
NCCAB	National Committee for Control of AIDS Bureau
ORPP	Outbreak Response Preparedness Plan
PH	Provincial Hospital
PHO	Provincial Health Office
TMRC	Traditional Medicine Research Center

UNPFA United Nations Population Fund  
 VHC Village Health Committee  
 VHV Village Health Volunteers  
 WHO World Health Organization

<b>Public Health Infrastructure &amp; Equipment, vehicles</b>			
<b>Buildings</b>	Progress during the month	Progress to date	
Consultancy services for preparation of bidding document		100%	Delayed consultancy with Ministry of Health leading to delayed start infrastructure programs
Khammouane Provincial Hospital		100%	Only refurbishment of emergency ward. The balance according to hospital needs is transferred to medical equipment and ambulance
District Hospital	30%	85%	Refurbishment works in Nakai, Mahaxai and Khamkeut hospitals have been completed in July 2006.  Second half of renovation works of the roof for the Khamkeut District Hospital restarted.  GMLT District Hospital new construction progressing well and is likely to be completed in first week of January 2007. Water bore hole has been completed. Water pumps installation is scheduled for December 2006.
Health Center	15%	65%	Refurbishment work for Nadou and Kengdaeng Health Centers have been completed in July 2006. Construction for Khetphid and Nasok HCs progressing well and is likely to finish by the end of December 2006. Contract for Nongbouakham Integrated Community Health Center (IHC) - in Resettlement Health Program - new construction has been delayed. (Note: Two additional IHCs belonging to health program are under Infrastructure budget) Boreholes in Kengdaeng and Nadou HCs have been completed. Water pumps installation is scheduled for December 2006.
Infrastructure maintenance			Most of the infrastructure maintenance will be required after 2008 onwards.

Medical & Other Equipment	Monthly Progress	Progress to date	
<b>Medical and Lab Equipment</b>			
Consultancy for preparation of bidding document		100%	Delayed consultancy with Ministry of Health leading to delayed procurement program
Medical Equipment (KMN Provincial Hospital, 4 District Hospitals and 6 Health Centers)	85%	95%	<p>Lot II items have been distributed to 4 district hospitals (DHs)</p> <p>Lot I, III and IV arrived and distributed to all health facilities. X-Ray machine will arrive in January 2007 in line with the completion of GMLT DH</p> <p>In addition, some biochemistry and laboratory equipment is on order as well. Further supply of medical equipment will be assessed according to need after completion of the construction work.</p> <p>The need for new hematology unit at provincial hospital was identified and procurement order placed.</p>
Ambulance Equipment and other sur-charges		90%	All ambulances have been installed with the emergency equipment. Provincial hospital ambulance equipment awaits arrival of the ambulance.
STIs Program	4%	20%	Develop STI services at provincial and district levels, including introductory workshops and drug revolving funds for STI Program. (This item originally was budgeted under medical equipment hence in this section)
<b>Non-Medical Equipment</b>			
Photocopier	0%	100%	One for each DHO and the Khammouane PHO
Computers & printers			Two sets to each district health office and two sets to Khammouane Provincial Health Office. One printer for PHO in September 2006 Internet cards for e-mail and internet services were provided to all four districts and the province
Audio-visual equipment (television and DVD player)			One set of television and DVD player to district health offices and health centers for health education program. Additional BCC equipment will be provided in 2006-07
Fridge, water cooler, LCD projector, fax and other items			One set to each district health office and district hospital and a fridge to Khammouane Provincial Health Office. Two fax machines for Nakai and Mahaxai DHOs in September 2006
Hospital beds (Khamkeut)			30 steel beds with mattresses to Khamkeut District Hospital
Hospital furniture (KMN Provincial Hospital, 4 District Hospitals and 6 HCs)			Health facility furniture preparation for procurement in progress.
Bed Nets, including impregnation	0%	30%	2,875 nets for 21 villages of Mahaxai, 3,011 nets for 35 villages of Gnommalat, 3,234 nets for 15 villages of Nakai and 2,364 nets for 15 villages of Khamkeut. Nets will be supplied regularly during the life of the project. Vector control measures/equipment will be provided according to need. Total: 11,500 bednets and 22,710 tablets of Supatab
Other package non-medical equipment			Other package of non-medical equipment will be provided according to the need after completion of refurbishment and new construction work
Road safety communication			This money will be spent in conjunction with overall road safety program in NTPC project areas.
<b>Vehicles</b>			
Motorbikes	0%	70%	12 motorbikes (6 from project and 6 donated by NTPC) distributed to DHOs and HCs. Plans of replacement mid project. Remaining 30% of funds are for replacement of bikes during the life of the project.
4WD Pickups	0%	80%	Four 4WD pickups procured and distributed one each to Nakai, Mahaxai, Gnommalat Districts and one to Khammouane Provincial Health Office. Vehicle use policy has been developed in conjunction with the GOL for exclusive use of health work.



Medical & Other Equipment	Monthly Progress	Progress to date	
Ambulances	25%	-19%	All four ambulances have been handed over.

Public Health Program - including awareness programmes			
Supplies - Drugs, kits, forms and manuals.	Progress during the month	Progress to date	
Drug and Medical Supply			
KMN Provincial Hospital		38%	Drug revolving fund for emergency is ongoing and is supervised regularly.
District Hospital		83%	Drug revolving fund for four districts is ongoing and is supervised regularly
Health Center		79%	Drug revolving fund for four health centers is ongoing and is supervised regularly
Community level (Village Drug Revolving Fund)		41%	Drug revolving fund for 68 villages is ongoing and is supervised regularly.
Community level (TBA kits)		67%	Traditional Birth Attendant kits to 96 trained TBAs is ongoing and is supervised regularly
Office and Vehicle Operating cost			Operating cost have been transferred to 4 DHs/DHOs and KMN PH/PHO 2 time per year, including health centers.
KMN PH/PHO			Progress in percentage will be more realistically calculated at quarterly intervals
DHs/DHOs			Progress in percentage will be more realistically calculated at quarterly intervals
HCs			Progress in percentage will be more realistically calculated at quarterly intervals
Others (training materials, printing forms, etc. ...)			Including BCC materials Obstetric registers in print 2007 calendar as health education materials – was designed and prepared during the month. Sent for printing and likely to be ready by mid-December 2006 Health checks and survey forms
Health Education and Awareness Program	Progress during the month	Progress to date	
STIs including HIV/AIDS	5%		Apart from regular health education program in health facilities, special health education and awareness activities are organized on special events such as World AIDS Day and boat racing festival.
			Substantial numbers of people from the community attend these public events - 43 public event sessions were held in four districts and in Thakhek until October 2006.
			Preparation for World AIDS Day for NTPC and related staff is in progress
			PCCA is organizing secondary school awareness program in Thakhek for the forthcoming World AIDS Day (WAD). They will also organize awareness and education program on STIs for service women in Thakhek. DCCAs are organizing special WAD programs in their respective districts.
			Introductory Workshop; Orientation Workshop; Preliminary interview and medical checks up of service women and setting up STI services in four districts
			Peer education training program – youth group in GMLT District on 7-10/11/06 and STI treatment for private pharmacies in Mahaxai on 2-3/11/06.

Public Health Program - including awareness programmes			
			<p>Peer education training program – High School student plans for the end of 2006.</p> <p>Preparation were made for World AIDS Day program by all five districts and staff of NTPC and partners.</p> <p>To date: 106 sessions and 21,038 participants</p>
Operating cost for PCCA/DCCA	0%		PCCA and DCCAs are responsible for carrying out education and awareness activities in the area of STIs including HIV/AIDS. Their capacity is limited but slowly improving. It is important to support them in this program for sustainability.
Relocation/medicinal plants			<p>Initial work was carried out. Further studies will be carried out in conjunction with National Traditional Medicinal Research Center after resettle population move into their permanent housing.</p> <p>Traditional Medical Research team visited GMLT and Nakai Districts for experimentally growing Artemisinin annua and identifying other medicinal plants for livelihood purposes. Project jointly conducted under the supervision of Agriculture, VFA and Project lands and coordinated by HPMU.</p> <p>Preparation for training of traditional healers is in progress with Traditional Medical Research team, to be held in December 2006</p>
Consultancy fees (Road safety, PHC, psychosocial, etc.)			This money will be spent in conjunction with overall road safety program in NTPC project areas.

Strengthening Human Resource in Public Health			
Supervision and Monitoring	Progress during the month	Progress to date	
Incentive			Incentive were distributed two times to provincial, district and health center in all project target areas, while only one time were provided to village health workers since they were trained in the past few months. Discussions are being held to find ways to link these incentives in future to performance. The third incentive program plans for the end of 2006.
Field visits for supervision and support			<p>Resettlement Health Program - bi-weekly visits to all resettlement sites for review of environmental and health situations, including emergency care for any patients.</p> <p>Regional Health Program - through integrated outreach program consisting of health center, district health and HPMU staff visiting health centers and villages.</p>
Integrated Outreach Program			<p>Integrated outreach work consist of more comprehensive health education and awareness on a number of health topics such as maternal and child health, STIs including HIV/AIDS, malaria, diarrhea, respiratory infections, hygiene and sanitation, road safety</p> <p>To date: 301 sessions and 16,723 participants</p>
Strengthening Health Service Delivery	15%		<p>Regular review of service delivery to district hospitals and health centers by district health staff.</p> <p>Emergency medical care/referral system training program organized through Provincial Hospital for the four District Hospital staff</p> <p>Emergency obstetric care referral system is also developed and will be reviewed quarterly</p> <p>Supervision was carried out in all health facilities including Provincial Hospital for EOC and new obstetric register use</p> <p>Maternal and Child Health service is being organized at monthly intervals for resettled populations. This will be followed by all health centers in their respective villages.</p> <p>HPMU staff provided variable levels of supervision and training to health center staff in different locations in conducting monthly Maternal and Child Health clinics (cumulative number of monthly MCH clinics held = 44)</p>

Training	Progress during the month	Progress to date	
Community level	5%		<p>Seven TBA training sessions (96 participants), seven VHV training sessions (101 participants) and seven VHC training sessions (66 participants). Periodical training and refresher program will continue throughout the life of the project.</p> <p><a href="#">Soya milk production training</a>  <a href="#">STIs training program for private pharmacies</a>  <b>To date: 24 sessions and 352 participants</b></p>
Health Center, District and Provincial levels	%		<p>Five training sessions including three TOT (MCH, STI, TBA and peer educator) (102 participants)</p> <p>Training sessions for all level of health workers will be repeated at periodical intervals depending on the subject matter.</p> <p>Laboratory services training is planned for June-July 2006</p> <p>STI Program - Peer educator training in 4 districts</p> <p>Emergency medical care/referral system training program organized through Provincial Hospital for the four District Hospital staff.</p> <p><b>To date: Ten sessions and 158 participants</b></p>
Long Term	%		<p>Two long term training session, namely emergency medicine and ICHC of three months (9 participants) and one month (two participants) respectively. Another 3-month course for Khamkeut District .....</p> <p>Long term training for X-Ray and Ultrasound in Vientiane for Gnommalat and Khamkeut District Hospitals during July to September 2006 is completed.</p> <p>One-month training on Maternal and Child Health in Vientiane for Kengdaeng Health Center staff will be completed on 5<sup>th</sup> October 2006.</p> <p>Emergency medicine training continue for Khamkeut in Vientiane – completion December 2006</p> <p><b>To date: Five sessions and 16 participants</b></p>
Study Tours		90%	<p>All district hospital and health center staff were taken for study tours to Integrated Community Health Center (ICHC) in Vangvieng and Taleo (59 participants)</p> <p><b>To date: Three trips and 59 participants</b></p>
Workshop on how to identify psychosocial/drug abuse problems			<p>It requires different methodology to assess the situation. The focus group discussions in future will reflect on this social problem if it exists in the communities</p>
On the job training			<p>This activity is incorporated with on the job training during supervision and support.</p> <p>TOT course on peer education in Thalad</p> <p>STI training program – treatment and lab for KK, GMLT and MHX DH staff</p> <p>Biochemistry training for Khamkeut and Khammouane PH</p> <p><b>To date: Six sessions and 28 participants</b></p>

Meetings	Progress during the month	Progress to date	Monthly meetings are held in each district and Khammouane Provincial Health Office. These meetings provide an opportunity for educational updates on conceptual and methodological aspect of health service delivery along with the achievements and future plan
Create Outbreak Detection and Response Preparedness Unit		100%	Implementation of the National Avian Influenza awareness program in conjunction with the provinces (Khammouane, Bolikhamxay and Savannakhet) To date: Two meetings and 35 participants
Meetings at provincial and district levels			Regular meetings at provincial and district levels To date: 79 meetings and 1,266 participants
Quarterly meeting at HC (VHVs, HCs)	10%		The first quarterly meeting at HC was held in Kengdaeng HC, Khamkeut District (30 participants) No reports yet from Nakai (2 sites), GMLT (2 sites) and Mahaxai (2 sites)
Health education materials and activities - design and production	10%		Support under health education program for all health facilities in the project areas. Number of IEC materials have been developed/ copied and distributed to district, health center and villages like posters, VCDs and DVDs. 2007 calendar as an educational material was designed and prepared during the month. Sent for printing and likely to be ready by mid-December 2006
Develop the procedures for the referral system			Referral system methodology being followed up
Zonal Health Committee Meeting (4 x per year for each ICHC; and for DH)			Same as quarterly meeting
Adapt ICHC accounting and management system			New system will not be introduced. Instead, GOL system similar to other areas in the province will be implemented

Public Health Monitoring and Surveillance	Progress during the month	Progress to date	
Task force meeting			To be redefined as the present definition is difficult to define.
Routine data collection/HIS			Routine data collection and collation. (Note: considerable backlog to be completed)
Outbreak Response Preparedness		100%	Report published and distributed in English. Lao version with the Ministry of Health for adoption and translation.
Outbreak Response Operational		10%	Translation of English report and distribution, followed by training workshops.
Scientific support			Scientific support and areas of support are being redefined. Possibility of getting assistance from additional sources.
Existing data analysis 2004		100%	Completed
Midterm survey	0%		Will be carried out in 2008-09, with planning starting in mid-2008
Special surveys	20%	25%	Health checks and survey in Nongboua and Sop On Villages completed.  Health checks and survey conducted in Bouama and Phonsavang Villages on 13-18 November 2006.  Data for Sop On, Bouama and Phonsavang is being clean and analyzed.
Monthly MCH clinics		20%	Monthly MCH clinic for Nongboua and Sop On villages are regularized now.  The monthly MCH clinics will be extended to the regional health program. Health center staff are being trained to conduct this activity at monthly interval in all villages.  HPMU staff provided variable levels of supervision and training to health center staff in different locations in conducting monthly Maternal and Child Health clinics (cumulative number of monthly MCH clinics held = 44)

Equity Fund	Progress during the month	Progress to date	
5% of total budget			With the fast track resettlement program in operation, there has been an increasing need for emergency provision for individuals. <a href="#">To date six individuals have been referred and paid for treatment in Provincial hospital Thakhek.</a> <a href="#">To date: Eight cases were referred to Khammouane PH</a>

# **Social Activities**

## **Nakai Plateau Resettlement**

## 2.3 Nakai Plateau Resettlement

### 2.3.1 General

November was another month of consolidation of the villages in transition – the eight villages that were established prior to and during the previous wet season. With the wet season now past, access roads which previously had been flooded and/or damaged were quickly repaired to enable construction and commerce to resume.

Excellent progress was made in both the northern and southern resettlement area access roads as well as the Southern Resettlement Road to Area 22, on the southernmost tip of the plateau. One immediate result of improved access can be seen in the numbers of traders traveling to and from the villages to engage in commercial activities, as well as the numbers of villagers traveling to and from Oudomsouk – for example students traveling in to high school.

The major technical issue facing the physical transition villages at present remains the quantity of sawn timber provided to building contractors to enable the completion of permanent houses. The shortfall of timber available from the resettlement areas, documented elsewhere, is being addressed through management/GOL consultations.

Rice and protein distribution programmes as described in previous reports is continuing, as are bi-weekly health checks. Consultations with transition villagers will be commenced in January 2007 in order to jointly agree on an appropriate plan for ramping down of transition support as villagers settle in and livelihood opportunities are provided.

The challenge remains in keeping the transition resettlers busy during the current phase of resettlement by continuing to provide a variety of livelihood opportunities and other activities that facilitate the development of a sense of ownership of the new villages among the Resettlers. These activities include the building of fences, establishment of home gardens, mushroom houses, animal pens, flowers and shrubs etc. As such, it is sometimes necessary, while encouraging the resettlers to act in accordance with appropriate technical principles, to accept that villagers will often engage in familiar practices during the stressful period following relocation.

Activities continued at village based agricultural extension and demonstration areas during September, notably at new Sop Hia (Area 8a), Sop Ma (Area 8) and Sop On (Area 19).

Construction of permanent housing progressed well in Boua Ma, Phonsavang and Sop On. There are now 220 houses under construction.

At the end of November 2006, the new villages of Sop On, Phonsavang, Boua Ma, Sop Ma, Sop Hia/Nam Nian (first group), Sop Phene and Sop Ma have been established with all villagers living in their new locations. All of the 142 households of Ban Done, and all of the 52 households of Khone Khen, are engaged in the clearing of house plots, after having built and relocated to temporary houses on their new plots. Access to Khone Kaen and Ban Done is now very good.

#### **Transitional Livelihoods:**

Currently 100% of agricultural plots have been cleared at new Sop On, 100% at new Phonsavang, and more than 50% at new Boua Ma. All the agricultural plots of the 8 Keng Yao families that moved to the Pilot Village have been cleared. These plots were planted with upland rice during the previous wet season, however the irrigation system extension will be completed during the coming months so that these villagers will soon be fully integrated within the pilot village.

Training and assistance in home gardens is on-going and most transition resettlers have productive gardens for home consumption and trade.

The opportunity to supply labor for work associated with village construction is provided to all villages, in addition to food support in the case of transition resettlers.

There remains a full time presence of NTPC and District supervisors and community facilitators in each village.

Most NAKAI activity has now shifted focus from implementation of Transition Relocation to planning and implementation of sustainable livelihood models.

Two schedules are presented in the following pages:

The first schedule shows the phases of resettlement for the various villages listed in order of potential impact by cofferdam and main dam

The second schedule shows progress of the respective tasks associated with resettlement of the same villages.



			statistical impact in 2006 (cofferdam)		statistical impact in 2007 (part. dam)				2006				2007				2008					
number	village name	hh # (2006)	10%	1%	10%	1%	new area	New area code	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4		
8	Ban Hat Khamphane	23	3	3	3	3	8	N1	preparation of transitional phase	transitional phase			relocation completed		Flood impact by dam partly built	Reservoir impounding						
9	Ban Sop Ma	23	3	3	3	3	8	N1	preparation of transitional phase	transitional phase			relocation completed									
10	Ban Keng Gnao	20	3	3	3	3	8	N1	preparation of transitional phase	transitional phase			relocation completed									
10	Ban Keng Gnao	8	3	3	3	3	16	N2	preparation of transitional phase	transitional phase			relocation completed									
13	Ban Sop On	104	3	3	3	3	19	N3	preparation of transitional phase	transitional phase			relocation completed									
14	Ban Done	142	3	3	3	3	21	N4	preparation of transitional phase	transitional phase			relocation							completed		
15	Ban Khone Khen	52	3	3	3	3	22	N5	preparation of transitional phase	transitional phase			relocation							completed		
5	Ban Sop Phene	56	2	3	3	3	11	N6	preparation of transitional phase	transitional phase			relocation completed									
11	Bouama	74	2	3	3	3	17	N7	preparation of transitional phase	transitional phase			relocation completed									
12	Ban Phonsavang	41	1	3	3	3	18	N8	preparation of transitional phase	transitional phase			relocation completed									
1	Ban Sop Hia	34	1	2	3	3	xx	Nx	relocation of lower hh on upper part of the old village	preparation of transitional phase		transitional phase		relocation						completed		
1	Ban Sop Hia (first group)	30	1	2	3	3	8a	N9		transitional phase			relocation completed									
	Ban Nam Nian (first group)	6	0	0	3	3	8a	N9		transitional phase			relocation completed									
4	Ban Nong Boua Kham	57	1	2	1	2	9	N10		preparation of transitional phase	transitional phase		relocation completed									
3	Ban Thalang	79	0	1	1	2	13	N11			preparation of transitional phase	transitional phase		relocation		completed						
6	Ban Nakai Neua	88	0	1	1	2	1	N12			preparation of transitional phase	transitional phase		relocation		completed						
2	Ban Nam Nian	30	0	0	3	3	xx	Nx			preparation of transitional phase	transitional phase		relocation		completed						
7	Ban Nakai Tai	179	0	0	1	2	2	N13			preparation of transitional phase	transitional phase		relocation		completed						
16	Ka Oy	10	0	0	0	0	19	N3				preparation of transitional phase		transitional phase		relocation completed						
16	Ka Oy	15	0	0	0	0	21	N4				preparation of transitional phase		transitional phase		relocation completed						
17	Ban Oudomsouk / Phon Phan	103+56	0	0	0	1		N14				preparation of transitional phase		transitional phase		relocation completed						

				Transition																												
				Topo survey	Village layout design (Housing)	Village layout design (Agric.)	up Hill relocation	Access track	UXO temp area	Logging temp housig area	drill wells, hand pumps	Temporar y Schools	Temp. toilets	Building Temp. houses	Commencem ent of Transition Resettlement	Transition Support - food, health, household goods	Target Date - full transition	UXO whole areas	Logging whole area	Road Construct ion	Stump Removal	Clear housing area	Start House Building	Dismantle house and transport	Water Supply	Electricity	Communit y Buildings	Agric land preparatio n	Other non-farm activites	Irrigation	Target Date - Permanen t Houses Complete	
New area code	new area	village to move in this area	hh # (2006)																													
N1	8	Ban Hat Khamphane	22				NR										T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N1	8	Ban Sop Ma	23				NR										T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N1	8	Ban Keng Gnao	21				NR										T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N2	16	Ban Keng Gnao	8				NR	NR		NR		NR					T2/06		NR									Jun-07			Feb-07	
N3	19	Ban Sop On	104				NR										T2/06										Dec-07	Jun-07			Dec-07	T2/07
N3	19	Ka Oy	30				NR						Mar-07	Apr-07			T2/07					Feb-07	May-08	Apr-07			Dec-07	Jun-07	Oct-07	Apr-07	Dec-07	T2/08
N4	21	Ban Done	142				NR										T3/06						Mar-07				Jun-08	Jan-08	Apr-07		Nov-08	T4/07
N5	22	Ban Khone Khen	52				NR										T3/06						Mar-07				Jun-08	Jan-08	Apr-07		Nov-08	T4/07
N6	11	Ban Sop Phene	56				NR										T2/06						Jan-07				Dec-07	Jun-07	Apr-07		Dec-07	T4/07
N7	17	Bouama	74				NR										T2/06										Dec-07	Jun-07			Dec-07	T2/07
N8	18	Ban Phonsavang	41				NR										T2/06										Dec-07	Jun-07			Dec-07	T2/07
N15	7	Ban Sop Hia	37					Feb-07		Mar-07	Mar-07	Apr-07	Apr-07	Apr-07	Apr-07	Apr-07	T2/07		May-07	Mar-07	May-07	May-07	May-07	May-07	May-07	May-07	Dec-07	Jan-08	Oct-07	Apr-07	Dec-07	T2/08
N9	8a	Ban Sop Hia (first group)	30														T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N3	8a	Ban Nam Nian (first group)	6														T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N10	9	Ban Nong Boua Kham	57				NR	Feb-07		Mar-07	Mar-07	Apr-07	Apr-07	Apr-07	Apr-07	Apr-07	T2/07			Jan-07	Mar-07	Mar-07	Mar-07	May-07	Feb-07	Dec-07	Jun-07	Oct-07		Dec-07	T1/08	
N11	13	Ban Thalang	73				May-07	Mar-07				Oct-07	Oct-07	Oct-07	Oct-07	Nov-07	Nov-07	T1/08			Oct-07	Oct-07	Oct-07	Nov-07	Mar-08	Oct-07	May-08	Nov-08	Dec-07		Nov-08	T1/08
N12	1	Ban Nakai Neua	89				May-07	Mar-07				Oct-07	Oct-07	Oct-07	Oct-07	Nov-07	Nov-07	T1/08			Oct-07	Oct-07	Oct-07	Nov-07	Mar-08	Oct-07	May-08	Nov-08	Dec-07		Nov-08	T1/08
N15	7	Ban Nam Nian	25				NR	Feb-07		Mar-07	Mar-07	Apr-07	Apr-07	Apr-07	Apr-07	Apr-07	T2/07		May-07	Mar-07	May-07	May-07	May-07	May-07	May-07	Dec-07	Jan-08	Oct-07	Apr-07	Nov-07	T2/08	
N13	2	Ban Nakai Tai	190				May-07	Mar-07				Oct-07	Oct-07	Oct-07	Oct-07	Nov-07	Nov-07	T1/08			Oct-07	Oct-07	Oct-07	Nov-07	Mar-08	Oct-07	May-08	Nov-08	Dec-07		Nov-08	T1/08
N4	21	Ka Oy	3				NR								Mar-07		T2/07						Nov-07	May-07			Jun-08	Jan-08	Apr-07	Apr-07	Nov-08	T4 / 07.
N14		Ban Oudomsouk / Phon Phan Pek	103+56				NR	NR			Nov-07	NR	NR	NR	NR	NR	NR				Nov-07	Nov-07	Nov-07	Nov-07	Apr-08	Nov-07	Apr-08	NR	Nov-08	May-08	Nov-08	T2/08

NR

Not Relevant

P

In procurement

C

Contract signed, mobilization phase

Implementation - On going

Task completed

### 2.3.2 Infrastructure

There was no rain in November and the four road construction contractors made various levels of progress during the month. Timber house construction has continued at four villages and the UXO contractor continued to make good progress.

#### ○ Topographic survey and mapping of indicative locations

The contract for the survey and mapping of an extra 237 ha near Area 13 for the Ban Thalang irrigated agriculture area was completed during the month.

The contractor completed a small contract for the survey and mapping and the installation of Nakai FSL beacons at Oudomsouk to identify the properties that will be either be flooded or impacted by the Nakai Reservoir. The survey also included about 15 ha at Ban Phone Pan Peck for a possible new Oudomsouk housing area.

Another small survey and mapping contract was signed and the work completed for another 27 ha of survey and mapping at Areas 1 and 2 for Nakai Neua and Nakai Tai.

#### ○ Finalization of village location – Village layout Design

Village Development Plans: All VG1 layouts have been completed (except for that portion of Sop Hia and Nam Nian that was previously scheduled to move to Nam Pan). The preparation of layouts for the remaining villages is underway as shown in the table below.

Name of the original villages in VG2	New village area	Village layout	Agriculture Layout
Thalang	Area 13	Complete	Complete
Nakai Tai	Area 2	Complete	Complete
Nakai Neua	Area1	Complete	Complete.
Done	Area 21	Complete	Complete
Khone Khen	Area 22	Complete	Complete
Oudomsouk and Phone Pan Peck	Oudomsouk Urban Area B and Area 15	First draft completed	Underway

#### ○ UXO search and clearance

The contractor continued to make good progress during the month and completed the search and clearance at the Area 15 agricultural and housing areas for Oudomsouk and Phone Pan Peck as well as a small miscellaneous area by Area 17.

From November 2005 to November 2006, the contractor has UXO searched and cleared 1,227 ha of resettlement area including miscellaneous small areas such as for the VFA sawmill and log storage areas, road earthworks borrow areas, cemeteries etc. Found and destroyed have been 1,487 UXO items, including 927 bomblets. Including the Khammouane Military contract areas, a total of 1,427 ha have been searched with a total finds of 1,709 items of UXO.

The same contractor also has a contract for "Resettlement Area UXO Community Awareness and Emergency Response Teams." The community awareness activities continue to progress smoothly and the system of villagers preparing response forms and placing them in "drop boxes" provided continues to work. Many educational materials have been prepared and distributed to the villages.

The response team continued to visit villages to check on reported suspect items. To the end of November 2006, 1,793 UXO items, including 1,616 bomblets, have been found and destroyed by the response team.

### ○ Roads and drainage

The design of access roads was completed at Area 7 for Sop Hia and Nam Nian and is underway at: Ban Thalang agricultural area, Oudomsouk Urban Area B for Oudomsouk PAPs that will be affected by Nakai Reservoir inundation; Nakai Tai and Nakai Neua.

There are four ongoing road construction contracts and with varying degrees of progress during the month.

#### Southern VG1 Access roads to and within villages:

Again there has been small progress and completion is about 87% for the construction of access roads to and within the new villages of Bouama (area 17), Phonsavang (area 18) and Sop On (area 19). The main problem is finding suitable gravel wearing course material as there is a general shortage of available material south of Oudomsouk.

#### Southern Resettlement Road:

Progress was improved on the contract for the construction of the Southern Resettlement Road, 11.765 km long. The construction is now about 66% complete.

#### Northern Access roads to and within villages:

The contractor has continued work on the construction of access roads to and within the new villages of Sop Ma (area 8), Vietic Sop Hia (area 8a), Nong Boua Kham (area 9), Sop Phene (area 11) and Thalang (area 13) housing area. It is estimated the works are about 80% complete.

#### Southern VG2 Access roads to and within villages:

The contractor has commenced the construction of access roads to and within the new villages of Done (area 21) and Khone Khen (area 22). The Contractor is working on Area 21 and the contract works are about 7% complete.

### ○ House Construction

Contracts for the construction of timber houses for VG1 resettlers have been awarded but only four companies have commenced construction. The problem is with the delivery of sawn construction wood. It is expected that the situation will improve during December, but not to an extent where the two remaining contractors can be given notice to proceed and this will be delayed further. The delays are due to:

- Original surveys by GOL overestimated the volume of construction hardwood species available;
- VFA sawmill equipment still in procurement;
- Restrictions on transporting logs to/from other sawmills (traffic management concerns)
- Complicated and time consuming procedures (tax exemption, permissions etc.)

Other contracts are planned to start as follows:

<i>Areas and Villages concerned</i>	<i>Contract No. and Contractor</i>		<i>Start Date</i>
Area 17 for Bouama Area 16 for Keng Gnao	C604	Area 16	20 March 06
		Area 17	19 May 06
Area 18 for Phonsavang	C605		16 May 06
Area 19 for Sop On	C606		21 April 06
Area 8 for Sop Ma / Hat Khamphane Area 8A for Sop Hia	C607	Area 8a	30 October 06
		Area 8	30 October 06
Area 9 for Nong Boua Kham	C608		deferred until timber supply secured
Area 11 for Sop Phene	C609		deferred until timber supply secured

The eight houses for Keng Gnao resettlers at Area 16 are complete. All the three Contractors (at Area 19 (Sop On), 18 (Phonsavang) and 17 (Bouama) have completed the construction of the work camps and progress with foundations and the concrete piers and continue their progress on the structural timber parts of the buildings. The three Contractors are now working on the following number of houses: Bouama, 74; Phonsavang 42; Sop On, 104.



New House in Pilot Village (Keng Gnao resettlers)

Houses under construction in new Sop On



### ○ Community Buildings

Each resettlement village will have a primary and nursery school, village office and meeting hall, market, warehouse and a rice mill and workshop. There will also be two clinics, four seed processing and agricultural storage facilities and four organic fertilizer facilities located at various villages. The sizes of most of the buildings will vary according to village size.

The preparation of bidding documents for the VG1 and some of the VG2a (schools and health centers) buildings is complete. However bidding procedures have not commenced as NTPC is waiting for a letter of no objection from the Bank.

### ○ Domestic Water Supply and Sanitation

As always and previously reported, resettlement village water supplies is a combination of:

- Rainwater collected from house roofs, via guttering and down-pipes to a 2,000 liters capacity tank; and
- Deep machine drilled boreholes equipped with VLOM (Village Level Oriented maintenance) hand pumps.

Toilet/bathrooms are and will be installed at every house and in some selected community buildings. The construction of the VG1 resettlers' rainwater collection facilities and toilet/bathrooms is included with the housing construction contract. The construction of these toilets/bathrooms is now completed for the 8 new Keng Gnao resettlers' families in Ban Nong Boua Pilot Village.

The same constraints than the ones met for the houses constructions still prevail for the toilet/bathrooms construction.

#### Boreholes with hand pumps:

The recapitulative progression for November 2006 and the summary of the actual performance vs initial and revised 5<sup>th</sup> update plan (based on the continuous reconciliation of the data on resettlers' population) is included in the following pages along with a tentative schedule of planned interventions for the next 4 months. This following summary also includes the boreholes drilled for the benefit of Project Affected Persons (PAPs) by the construction of the Nam Theun 2 infrastructure (ref. Table 1 "Project lands") as well as those under the health infrastructure rehabilitation plan (ref. Table 3).

A total of 18 successful boreholes were completed during November as described in the following recapitulative tables. As of the end of this reporting period, an actual total of 121 deep boreholes are successfully completed out of 133 drilled since the beginning of the operations in December 2005 with the Champasack Provincial Nam Saat drilling teams. The failure rate of about 9% remains constant and acceptable.

It is noteworthy to mention at this stage that:

- 1) According to the implementation plan based on a coverage of 1 installation for 8 resettlers' households (say about 50 users per well), the final targets regarding drilling operations have been reached in 6 new resettlement villages. Also, the drilling is completed in the 5 district hospitals and health Centers under the health Infrastructure rehabilitation programme.
- 2) The same targets are expected to be reached in end of January 2007 in 2 other new areas as Sop Hia (8a) and Sop Phene (11) as well as in the 7 villages which are finalized under the Project Lands interventions.
- 3) The operations are suspended in Bouama (area 17). Due to adverse soil condition in the village area, the rate of failure has reached some 40% and therefore further site investigations are needed with the cooperation and agreement of the villagers. It is foreseen that the 3 remaining due boreholes will be located around the village instead of inside, and therefore at a slightly further walking distance from houses than the ones that could be completed.

The main constraint remains the hand pumps installation that will allow the utilization of these wells. There is still only 66 hand pumps which have been installed, The imported Afridev VLOM deep well hand pumps ordered to UNICEF Supply Division through the National Water Supply and Environmental Health Programme (necessary arrangement due to non-eligibility of NTPC to access directly to UNICEF Procurement Services) are still not yet delivered to Laos. The procurement

process lasts since May 2006 and has been quite complicate on administrative aspects. Finally, a Purchase Order has been issued by UNICEF India on 10 November 2006 which provides expectation for delivery to Laos not before January 2007 the earliest.

As a collateral result of the Hand pump supply situation, the on-going contract with Champasack Nam Saat is now to be extended to the end of March 2007 instead of February as previously reported. February and March 2007 period will be mainly utilized for the complete and proper installation of the hand pumps, provided that can be made available on the field at the end of January

It is still planned to establish another contract to cover the remaining VG2b, VG3 and VG4 with starting date delayed until March 2007 immediately after the completion of the current contract.

#### Nam Theun 2 Power Company Ltd

#### ENVIRONMENTAL AND SOCIAL DIVISION

#### NTPC - Construction of machine drilled boreholes for domestic water supply

#### CONTRACTOR:

Provincial Public Health Department  
Champasack Province  
Environmental and Water supply Section

#### RECAPITULATIVE MONITORING DRILLING PERFORMANCE

#### SITUATION ON MONTH OF: NOVEMBER 2006

RECAPITULATIVE TABLE No 1: "Project Lands"						Balance vs plan		Total Completion							
			Initial plan - Dec 2005		Temporary Revised 5th Plan	Productive	Equipped	Total BHs drilled	Productive	Equipped	Failures	Failures	Completion November 2006		
			Option average coverage 8 Houses/BH	Difference initial plan vs temporary revised 5th plan	Option average coverage 8 Houses/BH	Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	% of total drilled	Productive	Equipped	Failure
No	New Area	Villages	Total Qty	Total Qty	Total Qty										
1	ODS New Urban area A (Oudomsouk May)	Oudomsouk SD12B PAPs	9	1	10	0	1	10	10	9	0	0.00	1		
2	ODS New Urban area C (Primary School)	Oudomsouk SD12B PAPs	1	0	1	0	0	1	1	1	0	0.00			
3	ODS	Oudomsouk SD12B PAPs - ODS old areas 8, 7 and market	5	0	5	0	0	5	5	5	0	0.00			
4	PPP	Pon Pan Pek - Intake PAPs	5	0	5	0	0	5	5	5	0	0.00			
5	NRC	NRC Oudomsouk	0	1	1	0	1	1	1	0	0	0.00			
6	GML	New 8 Houses GML	0	1	1	0	1	1	1	0	0	0.00	1		
7	GML	GML Horticulture Demonstration Center	0	1	1	1	1	0	0	0	0				
8	GML	Gnommalath Tay	0	1	1	1	1	0	0	0	0				
9	GML	Gnommalath Neua	0	1	1	1	1	0	0	0	0				
10	GML	Ban Lao Naa Ngam	0	1	1	1	1	0	0	0	0				
11	GML	Ban Phone Lath Khouey	0	1	1	1	1	0	0	0	0				
12	GML	Ban Tongmang	0	1	1	1	1	0	0	0	0				
13	GML	Ban Sangkeo	0	1	1	1	1	0	0	0	0				
14	xxx	Others - ESTIMATE QUANTITY - To be finalized and adjusted during implementation period as per demand.	22	0	22	22	22	0	0	0	0				
SUB TOTAL Project lands			42	10	52	29	32	23	23	20	0	0.00	2	0	0

RECAPITULATIVE TABLE No 2: "Nakai Plateau resettlement"																
			Initial plan - Dec 2005		Temporary Revised 5th Plan	Balance vs plan		Total Completion						Completion November 2006		
			Option average coverage 8 Houses/BH	Difference initial plan vs temporary revised 5th plan	Option average coverage 8 Houses/BH	Productive	Equipped	Total BHs drilled	Productive	Equipped	Failure	Failures		Productive	Equipped	Failure
No	New Area	Villages	Total Qty	Total Qty	Total Qty											
1	16	Ban Nongboua, Keng Nyao (PV)	7	1	8	0	3	8	8	5	0	0.00	3			
2	17	Ban Bouama	11	1	12	3	5	15	9	7	6	40.00	1			2
3	18	Ban Phonsavang	8	-1	7	0	0	8	7	7	1	12.50				
4	19	Ban Sop On	17	2	19	0	8	19	19	11	0	0.00				
5	8	Ban Sop Ma, Hatkhamphan, Keng Nyao	11	0	11	0	7	11	11	4	0	0.00				
6	8a	Ban Sop Hia Vietic	7	0	7	2	4	8	5	3	3	37.50				
7	9	Ban Nong Boua Kham	10	1	11	11	11	0	0	0	0					
8	11	Ban Sop Phene (incl. additional 2 BHs for temporary relocation)	9	2	11	9	10	2	2	1	0	0.00				
9	21	Ban Done	22	1	23	0	15	24	23	8	1	4.17	1			
10	22	Ban Khon Kaen	8	1	9	0	9	10	9	0	1	10.00	7			
11	1	Ban Nakai Tay	27	0	27	27	27	0	0	0	0					
12	2	Ban Nakai Neua	14	-1	13	13	13	0	0	0	0					
13	13	Ban Thalang	12	0	12	12	12	0	0	0	0					
14	7	Ban Sop Hia/ Nam Nian	11	-6	5	5	5	0	0	0	0					
15	KK	Ban Sop Hia/ Nam Nian	0	7	7	7	7	0	0	0	0					
16	xxx	Oudomsouk	15	-1	14	14	14	0	0	0	0					
17	PPP	Ban Pon pan Pek	0	2	2	2	2	0	0	0	0					
SUB TOTAL Resettlement villages			189	9	198	105	152	105	93	46	12	11.43	12	0	2	

RECAPITULATIVE TABLE No 3: " HEALTH INFRASTRUCTURE"																
						Balance vs plan		Total Completion								
			Initial plan - Dec 2005		Temporary Revised 5th Plan	Productive	Equipped	Total BHS drilled	Productive	Equipped	Failure	Failures	Completion November 2006			
				Difference initial plan vs temporary revised 5th plan		Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	% of total drilled	Productive	Equipped	Failure	
No	District	Buildings	Total Qty	Total Qty	Total Qty											
1	Gnommalath	Gnommalath Hospital	1	0	1	0	1	1	1	0	0	0.00	1			
2	Gnommalath	Khed Phit Health Center	1	0	1	0	1	1	1	0	0	0.00	1			
3	Gnommalath	Nadou Health Center	1	0	1	0	1	1	1	0	0	0.00	1			
4	Gnommalath	Nasok Health Center	1	0	1	0	1	1	1	0	0	0.00	1			
5	Kamkeuth	Kaeng Deng Health Center	1	0	1	0	1	1	1	0	0	0.00				
SUB TOTAL Health Infrastructure			5	0	5	0	5	5	5	0	0	0.00	4	0	0	
GRAND TOTAL			236	19	255	134	189	133	121	66	12	9.02	18	0	2	



Construction of machine drilled boreholes for domestic water supply in:

- 1) Resettlement Villages New Areas - Nakai District, Khammouane Province
- 2) Health Centers and District Hospitals - Gnommalath Dist., Khammouane Prov. and Khamkeuth Dist., Bolikhamxay Prov.
- 3) Project Land areas - Nakai and Gnommalath Districts, Khammouane Province

### INDICATIVE GENERIC TENTATIVE SCHEDULE OF IMPLEMENTATION

#### DRILLING AND EQUIPPING BOREHOLES OF MINIMUM 30 METERS AND MAXIMUM 60 METERS DEPTH

		General Data			Year 2007 - Tentative schedule					
New Area	Name of Village/Health Center/Hospital	Maximum Qty required (cov. 1/8HHs)	Qty already completed on date	Maximum Qty completion balance on date	Dec. 06 C675	Jan. C675	Feb. C675	Mar. Cxxx	Diff. perform. vs Max. Qty required on date	Remarks
1- Resettlement areas										
16	Ban Nong Boua (PV) (incl. additional 1 BH for 5 families)	8	8	0					0	Maximum Qtys target completed on date.
17	Ban Bouama	12	9	3					-3	Further sites selection needed. Balance 3 BHs possibly completed under other contract.
18	Ban Phonesavang	7	7	0					0	Maximum Qtys target completed on date
19	Ban Sop On	19	19	0					0	Maximum Qtys target completed on date
8	Ban Sop Ma/ Hatkhampan/Keng Nyao	11	11	0					0	Maximum Qtys target completed on date
8a	Ban Sophia Vietic	7	5	2	2				0	
9	Ban Nong Boua Kham	11	0	11	3	3			-5	Balance 5 BHs possibly completed under other contract.
11	Ban Sop Phene (incl. additional 2 BHs for temporary relocation)	11	2	9	9				0	Additional 2 BHs due to temporary relocation
21	Ban Done	23	23	0					0	Maximum Qtys target completed on date
22	Ban Khon Kaen	9	9	0					0	Maximum Qtys target completed on date
	SUB TOTAL 1 PHASE 1	118	93	25	14	3	0	0	-8	
xxx	Oudomsouk	14	0	14					-14	Not before 2nd half of 2007
	Pon Pan Pek	2	0	2					-2	Not before 2nd half of 2007
2	Ban Nakai Tai	27	0	27				3	-27	Contract not yet issued
1	Ban Nakai Neua	13	0	13				3	-13	Contract not yet issued
13	Ban Thalang	12	0	12				3	-12	Contract not yet issued
7	Ban Sop Hia/Nam Nian	5	0	5				5	-5	Contract not yet issued
xxx	Ban Sop Hia/Nam Nian	7	0	7					-7	Contract not yet issued
	SUB TOTAL 2 PHASE 2	80	0	80	0	0	0	14	-80	
Total 1 resettlement areas		198	93	105	14	3	0	14	-88	Possible BH drilling in march not under C675 contract
2- Health Centers and District Hospitals										
GML	Gnommalath Hospital	1	1	0					0	Maximum Qtys target completed on date
GML	Khed Phit Health Center	1	1	0					0	Maximum Qtys target completed on date
GML	Nadou Health Center	1	1	0					0	Maximum Qtys target completed on date
GML	Nasok Health Center	1	1	0					0	Maximum Qtys target completed on date
KK	Kaeng Deng Health Center	1	1	0					0	Maximum Qtys target completed on date
Total 2 Health Infrastructure		5	5	0	0	0	0		0	

		General Data			Year 2007 - Tentative schedule					
New Area	Name of Village/Health Center/Hospital	Maximum Qty required (cov. 1/8HHs)	Qty already completed on date	Maximum Qty completion balance on date	Dec. 06 C675	Jan. C675	Feb. C675	Mar. Cxxx	Diff. perform. vs Max. Qty required on date	Remarks
3- Project lands										
	Oudomsouk May - Area A - SD12B	10	10	0					0	Maximum Qtys target completed on date
	Oudomsouk Primary school - SD12B	1	1	0					0	Maximum Qtys target completed on date
	Oudomsouk old village - SD12B	5	5	0					0	Maximum Qtys target completed on date
	Pon Pan Pek intake PAPs	5	5	0					0	Maximum Qtys target completed on date
	NRC (Nakai) (total 3)	1	1	0					0	Maximum Qtys target completed on date
GML	New 8 Houses (GML)	1	1	0					0	Maximum Qtys target completed on date
GML	Gnommalath horticulture demonstration center	1	0	1		1			0	
GML	Gnommalath Tay	1	0	1		1			0	
GML	Gnommalath Neua	1	0	1		1			0	
GML	Ban Lao NaaNgam	1	0	1		1			0	
GML	Ban Phonlathkhuey	1	0	1		1			0	
GML	Ban Tongmang	1	0	1		1			0	
GML	Ban Sangkeo	1	0	1		1			0	
	Others - To be finalized and adjusted during implementation period	22	0	22					-22	Location and Quantities Not included in schedule - Locations and required quantities to be finalized on a case by case basis according to demand
Total 3 Project lands		52	23	29	0	7	0	0	-22	
GRAND TOTAL PLANNED		255	121	134	14	10	0	14	-110	

Update 30.11.2006

Expected maximum remaining implementation period for contract C675

Only HP installation activities

### ○ Irrigation Systems

The construction of the extension area to the Pilot Village irrigation scheme for the resettlers from Ban Keng Gnao resumed in November. The contractor has excavated most of the trenches for the pipelines and has started the installation of pipes.

The preparation of irrigated agricultural layouts is part of the resettlement village planning exercise and this has been reported on above.

Permanent irrigation agriculture cannot commence until there are transmission lines are installed to power the irrigation pumps until there is Nakai Reservoir water to pump from (apart from areas 17, 18 and 19, which will have the use of water from the Theun Duane and Houay Malai).

It has been decided to undertake the construction of a pilot irrigation area at Sop On (area 19) using ground water for irrigation. Therefore bore holes will be drilled and small submersible pumps, powered by generators, installed.

### ○ Electricity

The installation of the transmission lines is continuing at the VFA Sawmill. Between supervising these contracts plus the contract for the NTPC Nakai Residential Complex, the Senior Electrical Engineer is continuing with the preparation of design, layouts and quantity estimates for the resettlement villages. To date designs have been completed at five villages.

## 2.3.3 Livelihood

Appointment of new livelihood coordinator. Reorganization of the Nakai Livelihood on-going.

Third mission of Livelihood Advisor cancelled.

### ○ Communication

No change from previous report.

### ○ Staffing

No change from previous report.

### ○ Institutional strengthening

No change from previous report.

### ○ Land allocation

No change from previous report.

## 2.2.3.1 Nakai Plateau Forestry Development Program

### ○ Logging

The logging operation of VFA has been carried out by Nakai Transportation Association and the Logging Units with different villages. The logging operation has been implemented with the procedures guidance and area allocated for VFA. The total volume of logging 1,524 m<sup>3</sup> has been approved by PAFO (volume based on the survey in and around the area of the new village settlement area, agriculture land, construction area, new road construction and other project area).

#### 1. Inventory for logging :

• Ban NamNian Mai	2,751 Trees	Volume	1,995.955 m3
- Construction woods	1,268 Trees	Volume	804,311 m3
• Ban Sophia	748 Trees	Volume	279.976 m3
- Construction woods	353 Trees	Volume	126.652 m3
Total	3,499 Trees	Volume	2,275.931 m3
- Construction woods	1,621 Trees	Volume	930.963 m3
• Boundary VFA and Reservoir	1,657 Trees	Volume	1,212.679 m3

**Total** (wood for construction) **3,278** Trees    Volume **2,143.642** m3

## 2. Cutting, Skidding and Transportation to 2nd Yard

- |                            |                    |         |                     |
|----------------------------|--------------------|---------|---------------------|
| • Cutting                  | Logs: 993          | Volume: | 762.989 m3          |
| • Cutting                  | Logs: 943          | Volume: | 646.706 m3          |
| • Cutting(Khone Kaen)      | Logs: 159          | Volume: | 115.156 m3          |
| <b>Total Cutting Logs:</b> | Logs: <b>2,095</b> | Volume: | <b>1,524.851 m3</b> |

### 3. Transportation 2 nd Yard to Nakai Sawmill

- |                                      |            |                         |
|--------------------------------------|------------|-------------------------|
| • Nakai Sawmill: Number of Logs      | 254        | Volume 206.35m3         |
| • Khamsavath Sawmill: Number of Logs | 314        | Volume 356.007m3        |
| <b>Total</b>                         | <b>568</b> | <b>Volume 562.357m3</b> |

#### 4. Transportation Logs to Lak 20 Sawmill

- Lak 20 Sawmill: Number of Logs **1,440** Volume **1,440.106 m3**
  - Sawn timber
    - Total Sawn timber: **2,959m3**
      - Nakai Sawmill 1,069m3
      - Khamsavath 515m3
      - Lak 20 1,375m3
    - Timber supply for 3 contractors: **1,795m3** , **Total delivery 1,856 m3**
    - Timber remained in VFA Yard: Volume **1.102 m3**

The provision of timber to the supply of wood for housing construction for new resettlement NT2 project of 3 villages Ban Phonsavang, Ban Sop On, Ban Bouama from May to November 2006 are summarized :

- Total volume timber delivery at construction site **1,795 m3**

- Charcoal & Brick making

- Making 8 new Charcoal kiln for 4 Villages:
- Villagers income from selling charcoals

	Location	kiln	Production (bags)	Cost/bag (kip)	Amount (kip)
1	Ban Bouama	1			
2	Sop Phene	2	16	10,000	160,000
3	SopMa	2	22	10,000	220,000
4	Sophia	3	22	10,000	220,000
					<b>600,000</b>

- Furniture Making

12 wooden Panels, different simple for souvenirs

- Office Table 1 unit
- Handicraft
  - sample boats, 3 sets
  - Picture frame 4 sets
  - Shirt hangers 6 sets
  - Cabinet for maps 1 Unit
  - Decorating Poles 10 Units

- Silviculture (Plantation, Nursery, Enrichment)

- Grass seed harvesting :
 

- ELEUSINE weeds	344 kg
- Ruzi	339 kg
- Maintenance fencing for Plantation and Enrichment Areas
- Monitoring patrolling and fire guard

○ VI. Awareness campaign

- Meeting with villagers in 15 villages, consulting about future role of VFA and fire prevention, policy and legal framework relating to forestry.

○ VII. Strengthening of VFA

- Drafting guideline for Forestry Unit at village level
- Drafting guideline for strengthening Divisions of VFA.
- Review draft Agreement between NTPC and VFA

○ VIII. Others:

- Participating E&S management Meeting (Timber supply)

Meeting with provincial authorities of Khammouane, Savannakhet and Bolikhamxay about timber supply from lowland areas.

### 2.2.3.2 Nakai Plateau Agricultural and Livestock Development Program

The 2 technical Assistants have finalized:

- a technical program from November 2006 to June 2007
- Agriculture and Livestock implementation schedule for each village up to June 2007

Training for the agriculture/livestock staff:

- 15 November 2006 (21 attendants): reminder on farmer's situation before resettlement (traditional system), NTPC current proposals and assessment (advantages, limits), presentation of the new approach.
- 20-21 November 2006 (55 attendants (24 DAFO)): Agro-ecology first sensitization and DMC techniques.
- In order to train the staff and see the timing for plots preparation, 2 volunteers farmers of Bouama have prepared their 0.66 plots accordingly to the new approach (slashing without burning, keep trees in the plots, biomass not removed from the plot), with traditional fence. It will permit to review the compensation rates.
- Demonstration and trial plot with DMC techniques set up in Nong Boua village.
- Demonstration and trial plot on fertilization set up in Nong Boua Extension Center.

○ Transition resettlement villages

Activity	Input / Support	Output / Result	Assessment
1. Establishment of temporary vegetable garden	<p>Provided continuously vegetable seed and seedlings as follow:</p> <p><b>SEED:</b>  Onion: 12.5 kg  Morning glory: 15 kg  Long bean: 3.5 kg  Coriander: 23.7 kg  Cucumber: 0.8 kg  Pakchoy: 1.35 kg  Squash: 0.7 kg  Pumpkin: 0.4 kg  Chinese cabbage: 0.02 kg  Lettuce: 0.075 kg  Dill: 0.5 kg</p>	<p>The dry season vegetable is continuously grow in the temporary garden around the house by using borehole water because an irrigation system is not constructed yet.</p> <p>The temporary vegetable garden is already started at Ban Done and completed for 104 households in 2,613 m2 of area as well as Khone Kaen is completed for 25 households and this activity is on-going.</p>	<p>The trial irrigation system is designed by infrastructure team to install at Sop On and expected to be used soon.</p> <p>Vegetable cultivation is mainly for house consumption and the surplus product can be sold as household income.</p> <p>Bio-fertilizer production technique is already trained for 9 households of Sop Hia. The plan is continuously to train</p>

Activity	Input / Support	Output / Result	Assessment
	<b>SEEDLING:</b> Cabbage: 804 seedling Cauliflower: 341 seedling Broccoli: 270 seedlings Eggplant: 428 seedling Chili: 675 seedlings Tomatoes: 160 seedling Provided 7,350 kg of Bio-fertilizer and 11 liter of Bio-Extract liquid for pest control, this product is produced from poison herb.	Produced some vegetables at the three resettled villages (Sop Phene, Sop Hia and Sop Ma) as follows:  Pakchoy: 104 kg Onion: 138 kg Coriander: 45 kg Morning glory: 15 kg Long bean: 27.5 kg Cucumber: 15.5 kg Squash: 18 kg Mint: 35 kg Lemon grass: 15 kg Eggplant: 292 kg Tomato: 32 kg  Another 3 resettled village are produced several vegetable as follow: <ul style="list-style-type: none"> <li>• Sop On: 220 kg</li> <li>• Boua Ma: 119 kg</li> <li>• Phonsavang: 54 kg</li> </ul>	several ago-technique for every household of each resettled village and then they can do it themselves after the project is finished
2. Crop seed supply and Fruit trees distribution	Vegetable seed were distributed to transition resettlement village are mentioned above.  Conducted the need assessment of fruit trees plantation of the resettlers at Boua Ma and in next month we will provide the fruit trees seedlings to 16 households		Follow up and on-going
3. Agriculture land clearing	This activity is not implemented during the month of November but will be conducted at the beginning of 2007.		Setting up the implementation plan and follow up.
4. Agriculture land fencing	The resettlers of Sop Phene, Sop Hia and Sop Ma is completed the preparation of fencing post	The agriculture land fencing will be used the wood (local material) instead barbed wire that has been used before because of sustainability	Follow up
5. Household income from surplus vegetable production	As we known that the main objective of temporary vegetable garden is only for house consumption but some households have some surplus production for selling and earned a small income.	Some households sold several vegetables from their owner temporary garden and get some income as follow:  At Sop On, 45 households earned 345,500 kip  At Phonsavang, 5 households earned 117,000 kip	At Boua Ma 18 households are expanded 615 m2 of area of temporary vegetable garden.  At Sop On 4 households are expanded 148 m2 of area of temporary vegetable garden.

Activity	Input / Support	Output / Result	Assessment
		<p>At Keng Gnao, 8 households earned 219,00 kip</p> <p>At Boua Ma, 25 households earned 487,000 kip</p> <p>At Sop Hia, 9 households earned 122,500 kip</p> <p>At Sop Phene, 8 households earned 103,000 kip</p> <p>At Sop Ma, 6 households earned 67,000 kip</p>	<p>At Sop Hia 4 households are expanded 61 m2 of area of temporary vegetable garden</p> <p>At Sop Ma 9 households are expanded 57 m2 of area of temporary vegetable garden</p>
6. Contour bunding	Based on the new approach of agriculture and livestock program is not necessary to build the contour on the slopping land because we will grow the cover crop to protect the soil erosion and also for soil improvement.		It will be grown the cover crop in the coming wet season 2007
7. Mushroom production	<p>Provided 5,750 bags of sawdust mushroom spores to the resettled village as follow:</p> <p><b>Boua Ma:</b> 1,100 bags (5 hh)</p> <p><b>Sop Hia:</b> 1,000 bags (5 hh)</p> <p><b>Sop Ma:</b> 250 bags (1 hh)</p> <p><b>Sop Phene:</b> 1,000 bags (5 hh)</p> <p><b>Keng Gnao:</b> 2,400 bags (8 hh)</p> <p>Constructed 1 mushroom house for one household at Sop Ma</p>	<p>Mushroom is produced by village as follow:</p> <p><b>Boua Ma:</b> 62.4 kg and earned 456,000 kip (10 hh)</p> <p><b>Phonsavang:</b> 13 kg and earned 30,000 kip (2 hh)</p> <p><b>Sop On:</b> 11.7 kg and earned 27,000 kip (2 hh)</p> <p><b>Sop Ma:</b> 11.6 kg and earned 50,000 kip (1 hh)</p> <p><b>Sop Phene:</b> 47.4 kg and earned 214,000 kip (4 hh)</p> <p><b>Sop Hia:</b> 38 kg and earned 100,000 kip (3 hh)</p> <p><b>Keng Gnao:</b> 18.8 kg and earned 98,000 kip (5 hh)</p> <p>9 households of Sop Hia already got a training on mushroom production from the agricultural extension center at Sop Hia</p>	<p>Mushroom production is one important component of familial food security and very suitable for every household even vulnerable household. Follow up and continue to promote.</p> <p>We had a plan to conduct the training for 4 households per week on mushroom production for the resettlers of Sop Hia, Sop Ma and Sop Phene</p>
8. Buffalo relocation	As we known this coming wet season will be flooded widely more than last year. So, in collaboration with RMU and DWG, we are preparing the plan to relocate the remaining buffalo "khouay Hae"		Follow up. Actually, the livestock relocation of the resettled villages is almost completed particularly 5 villages of the southern part of resettlement site because the grazing land area of cattle is the same

Activity	Input / Support	Output / Result	Assessment
	approximately 500 heads are now grazing in the forest but firstly we have to conduct a meeting with the villager on this issue		area of new resettlement site
9. Buffalo shed	The project provided the barbed wire and nail and also payment for labor but another material (e.g. wood, etc.) is carried out by resettlers themselves.	Based on the new approach, we will consider more specify about the standard of animal shed and also location to be install of such shed. In addition, we should also adjust the compensation rate for the animal shed	Follow up
10. Poultry and pig shed	Supplied the bamboo sheet wall, thatch for roofing and nail but labor is undertaken by resettlers themselves.	It must be implemented as same as the buffalo shed.	Follow up
11. Animal Vaccination	Supplied the animal vaccine to the resettled village including four (4) pre-resettlement villages (Nakai tai, Nakai Neua, Thalang, Nong Boua Kham)	Animal were vaccinated during the month of November as follow: Buffalo: 190 heads Cattle: 18 heads Pig: 172 heads Poultry: 1,410 heads	On-going and follow up

### ○ NB-Pilot Village

The vegetable cultivation is going on throughout the year and now pilot village is already commenced to grow dry season vegetables. The major vegetable is grown in dry season such as: cabbage, cauliflower, broccoli, onion, lettuce, pakchoy etc.

Activity	Input / Support	Output / Result	Assessment
1. Dry season crop cultivation	<p>Vegetable seed were distributed to pilot village:</p> <ul style="list-style-type: none"> <li>• M. glory: 4 kg</li> <li>• Spinach: 0.1 kg</li> <li>• Lettuce: 0.08 kg</li> <li>• Pakchoy: 0.18 kg</li> <li>• Cabbage: 0.05 kg</li> <li>• Chili: 0.5 kg</li> <li>• Pumpkin: 0.6 kg</li> <li>• Tomato: 0.05 kg</li> <li>• Lettuce: 0.08 kg</li> </ul> <p>According to vegetable seedlings production is undertaken directly by villager themselves. They organized 6 sites for producing of such seedling. The total vegetable seedling is produced for 3th round as follows:</p> <ul style="list-style-type: none"> <li>• Cabbage: 5,912 seedlings</li> <li>• Cauliflower: 2,991 seedlings</li> <li>• Broccoli: 2,119 seedlings</li> <li>• Chili: 7,810</li> </ul>	During the month of November, vegetable is grown in the area 0.22 ha and 0.10 ha of which is grown cabbage and also 0.03 ha of which is grown cauliflower respectively.	On-going and follow up



Activity	Input / Support	Output / Result	Assessment
	seedlings • Eggplant: 1,948 seedlings • Tomato: 546 seedlings		
2. Bio-Fertilizer production	Supplied raw materials to produce organic fertilizer (e.g. rice husk, animal dung, rice bran etc.)	Produced 4,920 kg of Bio-fertilizer by 19 households. Those fertilizer is applied into their owner vegetable garden	On-going and Follow up
3. Vegetable production	Vegetable cultivation is continuously activity to implement throughout the year and the project also supplied continuously the necessity input to villager (vegetable seed, tools, etc.). Regarding the CA, we shall reduce about 20% some input (fertilizer, crop seed etc.) after 4 years of resettlement period.	24 households still continue to grow the dry season vegetables and the total planted area was 1.6 ha. During the month of November vegetable production is follow: • Coriander: 33.5 kg • Morning glory: 51 kg • Pak Choy: 310.4 kg • Spinach: 12 kg • Onion: 22.1 kg • Cauliflower: 144 kg • Broccoli: 120 kg  The vegetable production is still continue to harvest	24 households earned 2,185,000 kip from vegetable production
4. Mushroom production	Only 600 bags of sawdust mushroom spores were supplied to two households of pilot village.	Produced 104 kg of mushroom, 61.5 kg of which is sold and earned 615,000 kip. Mushroom production is one better source household income of the pilot villager that we should also continue to promote in each resettlement village.	On-going and follow up
5. Livestock raising	Up to now 20 forage plots (1,600 m <sup>2</sup> /plot) has been established for 20 households but we should improve	Livestock is a one source income of pilot villager particularly buffalo. Up to date, at pilot village has some livestock as follow: • Buffalo: 192 heads • Cattle: 55 heads • Poultry: 264 heads	Follow up.
6. Animal Vaccination	The animal vaccination is carried out by pilot villager themselves by using the animal vaccine revolving fund under supervision of DWG technical staff (DAFO).	The vaccination of buffalo, cattle and poultry is completed.	Follow up

### ○NB-Agricultural Extension Centre (Zone I)

The major role and function of the center is to produce Bio-fertilizer, sawdust mushroom spore and pig, poultry to supply to the resettlement village including pilot village and also provide the crop seed and seedling and technical assistance to the resettlers. From January 2007, the main activity of the center will be only two activities such as: trial on crop / agro-technique and crop seed multiplication.

Activity	Input / Support	Output / Result	Assessment
1. Bio-Fertilizer production		Produced 10,680 kg of Bio-fertilizer 4,920 kg of which is produced by the villager of pilot village. Produced also 270 liter of Effective Micro-organism (EM). 1,900 kg of Bio- fertilizer were distributed to the transition resettlement villages (Ban done and Sop On). We have now 3,880 kg in the stock.	Bio-fertilizer and EM production is continuously produced for supplying to the resettlement villages in order to improve to soil fertility and increasing of the crop yield. On the other hand, it is to avoid the use of any agro-chemical.
2. Vegetable seed and seedlings supply	Provided several vegetables seed to the transition village such as: Cabbage: 0.2 kg Cauliflower: 0.1 kg Broccoli: 0.1 kg M. glory: 6.5 kg Tomato: 0.34 kg Longbean: 2.2 kg Pakchoy: 3 kg Dill: 0.15 kg And another vegetable seed	The vegetable seed were distributed to: 1. NB-Pilot village: Cabbage: 0.05 kg Tomato: 0.04 kg Morning glory: 4 kg Chili: 0.5 kg Lettuce: 0.08 kg Pakchoy: 0.24 kg	On-going and follow up.  Vegetable seedling is now producing at the each village and then will be distributed to the resettlers.
3. Mushroom production	Produced 4,000 bags of sawdust mushroom spore	2,350 bag of sawdust mushroom spore were distributed to the transition villages including pilot village as follows:  Boua Ma: 1,100 bags Sop Ma: 250 bags Sop Phene: 400 bags Nong Boua: 600 bags	On-going and follow up
4. Livestock raising	Continuing to produce the pig and poultry to supply to the resettlers. The total number of livestock in the center is follows: <ul style="list-style-type: none"> <li>Pig: 16 heads (including 11 piglets)</li> <li>Chicken: 117 heads</li> <li>Cattle: 3 heads</li> </ul> 102 chickens were vaccinated Fowl cholera	Hatching 24 chickens.	Follow up

○ Theun Douan-Agricultural Extension Centre (Zone II)

Activity	Input / Support	Output / Result	Assessment
1. Bio-fertilizer production		Produced 20 liter of effective micro-organism liquid (EM) and 1,500 kg of Bio-fertilizer.  Bio-fertilizer were distributed to: Boua Ma: 500 kg Sop On: 450 kg Phonsavang: 500 kg	Bio-fertilizer should produce more at least 2,000 kg per month to supply to vegetable garden in this dry season. Up to date, The temporary vegetable garden area is expanded as follow: Boua Ma: 615 m2 (10 hh)
2. Mushroom production	Produced 2,000 bags of sawdust mushroom spores	Supplied 1,800 bags of sawdust mushroom spores to the transition resettlement villages as follow: Boua Ma: 600 bags Sop On: 400 bags Ban Done: 800 bags  Constructed 2 mushroom houses at Boua Ma and 7 mushroom house at Ban Done	Still continuing to encourage the resettlers to grow the mushroom. We will have a plan to conduct directly the training (learning by doing approach) on mushroom production for the resettlers at their owner village as same as we doing now at Sop Hia village.
3. Fruit trees propagation		Produced 100 pruning of pomelo.	To be distributed continuously to the resettlers in next month
5. Poultry raising		We have now some livestock in the center: Chicken: 102 heads (hatching 10 chickens) Duck: 63 heads Pig: 4 heads	Follow up
6. Crop seed multiplication	Continuing to conduct demonstration plot on several crop and also crop seed multiplication	Seed multiplication is conducted in the planted area as follow: Long bean: 50 m2 Cucumber: 400 m2 Pakchoy: 180 m2 Chilli: 100 m2 Lettuce: 30 m2 Eggplant: 100 m2	On-going and follow up

○ Nakai Neua - Fruit Trees Propagation Centre

Activity	Input / Support	Output / Result	Assessment
1. Distribution of fruit trees grafted branches	This month we did not distributed any fruit trees seedlings but we conducted only the survey of the interested resettlers who wants to grow fruit trees around their house		Follow up
2. Grafted seedling production		Produced the grafted branches: <ul style="list-style-type: none"> <li>• Mango: 250</li> <li>• Lemon: 220</li> <li>• Litchi: 278</li> </ul>	The grafted branches are not yet cut out from parent plants as follow: Mango: 344 Lemon: 1,880 Litchi: 414 Jack fruit: 116
3. Fruit trees seedlings in the nursery	We have some fruit trees grafted branches in the nursery which is ready to distribute to the resettlers as follow: Mango: 2,346 Mandarin: 400 Lemon: 7,135 Litchi: 1,539 Jack fruit: 191 Rose Apple : 420 Pomelo : 2,742		To take care and Follow up
4. Bio-fertilizer production	Produced 1,720 kg of Bio-fertilizer	Provided 2,240 kg of Bio-fertilizer to the transition resettlement village as follow: Sop Ma: 700 kg Sop Phene: 540 kg Sop Hia: 1,00 kg	The target plan is to produce at least 2,000 kg per month of Bio fertilizer

### 2.2.3.3 Fisheries Reservoir Program

The contract for the Implementation plan of Nakai Plateau reservoir management and fisheries has been cancelled.

### 2.2.3.4 Community Development Program

#### ○ Non-farm CD (Rice & protein support)

Activities / Locations	Dates	Participants	Outputs/ Results
Distribute the protein for 8 villages VG1	6-27/11/06	DWG: 1pers VRC: 1pers/ village Village Authority: 1pers/village	Distributed protein for 2,805 villagers (weekly)
Distribute the rice for 8 villages VG1	7-9/11/06	DWG: 1pers VRC: 1pers/ village Village Authority: 1pers/village	Distributed rice for 2,805 villagers (monthly)  Rice: 43,218kg
Provide the nursery equipment ( Ban Done and Ban Khone Kaen )	14/11/06	DWG: 1pers VRC: 1pers/ village Village Authority: 1pers/village Teachers: 4pers	Ban Done: 2 sets swing, 3sets sliders. ) Ban Khone Kaen: 1 set swing, 1set sliders . . . . . )
Provide educational materials ( pens, books )	17/11/06	DWG: 1pers/ village VRC: 1pers/ village Village Authority: 1pers/village Teachers: 23pers (7women)	Completed providing educational materials for Ban Sop Phene.
Food support to children relocation village VG1	24/11/06	DWG: 2pers/ village Village Authority: 1pers/village Teachers: 23pers (7women)	Provided food support to children (465 pers) in relocation villages of VG1

#### ○ Non-farm CD (Vulnerable HHs support)

Activities / Locations	Dates	Participants	Outputs/ Results
Conduct workshop on Vulnerable HHs support for policy and strategy set up ( at District level )	10/11/06	RMU: 2pers (1pers women) SRO: 4pers(1pers women) DWG: 5pers	All understand and adopt working procedures

○ ICD

Activities / Locations	Dates	Participants	Outputs/ Results
Nakai tai Resettlement Village layout consultation	15 /5/06	SRO: 3 pers DWG: 1 pers Villagers: 164 pers (39women)	All understand and agree with the Nakai Tai village Layout (to be merged into Nakai village with Nakai Neua).
Kaoy village Relocation activities planning consultation	25 /11/06	SRO: 3 pers DWG: 2 pers Villagers: 29 pers (9women)	All understand and agree with the Kaoy village relocation activities detailed planning
Conduct training on Development concept and Management in the Southern villages for LNFC and VRC: Ban Done and Ban Khone Kaen (at village level)	30/11/06	SRO: 2 pers DWG: 1 pers Villagers: 20 pers (1women)	All understand and adopt Development concept and Management procedures (to carry out their tasks effectively)

○ PCR & RS (CD)

Activities / Locations	Dates	Participants	Outputs/ Results
Arrange Ban Sop Hia villagers to Peungphai ( possible new location area )	29/11/06	SRO: 3pers RMU: 2pers Villagers:12pers (6womwen)	Villagers did not want to move in this new site



*Village Layout consultation (Ban Nakai Tai )*



*Village Relocation activities planning ( Ban Kaoy )*

# **Social Activities**

## **Downstream Areas**

## 2.4 Downstream Areas Development Plans

- Work continued to develop livelihood restoration activities, including development of village organizations, village revolving and savings funds, and demonstration farms within the selected pilot villages.
- Work continued to finalize employment contracts for additional staff, as noted in previous monthly progress reports. Most of the new staff members will commence work during January 2007.
- A revised version of the Downstream Restoration Program documentation was prepared and posted on the secure website during early November.
- Household fish catch monitoring continued in the 39 selected villages (195 participating households) downstream of Nakai Dam and downstream of the power station during the month of November.

Activity	Completed to date	Remaining to be completed	Total
<b>Individual Household interviews</b>	641	140	781
<b>Village assessments</b>	39	0	39
<b>Fish trader interviews</b>	13	47	60
<b>Large scale fishing interviews</b>	25	5	30
<b>Traditional community fishing interviews</b>	61	239	300

- Activity continue to enter fish catch monitoring data into the fish catch monitoring database

The following tables summarize Downstream Program activities in the 21 pilot villages.



**Reporting Period: January - November, Year: 2006**

No.	Village Name	Members Saving Group this month (HH)	Total NTPC Compensation Funds transferred (Kip)	Opening Saving Deposited Balance (Kip)	Savings Deposited this month (Kip)	Total Loans Disbursed this month (Kip)	Total Loans Repaid this month (Kip)	Total Loan Interest Received this month (Kip)	Total Loans Outstanding but Not Yet Due (Kip)
1	Pha Thung/Phone Khene	68	149,975,046	4,725,000	1,391,000	1,200,000	1,500,000	412,000	4,900,000
2	Nong Ping	39	229,935,037	5,013,000	940,000	1,300,000	400,000	207,000	3,949,000
3	Khoksavang	55	161,969,045	2,453,000	481,000	900,000	300,000.0	138,000	1,900,000
4	Mahaxaitai	113	231,249,970	25,918,400	2,989,000	41,400,000	7,600,000	2,445,000	37,900,000
5	Povaneua	83	220,000,048	15,796,000	1,560,000	56,500,000	4,900,000	1,447,000	41,800,000
6	Povatai	55	278,400,434	46,561,000	2,843,000	46,500,000	5,000,000	4,820,000	76,190,000
7	Khamfeuung	53	118,750,045	2,351,000	624,000	41,600,000	900,000	470,000	1,900,000
8	Kengpe	54	108,750,048	1,290,000	620,000	700,000	-	21,000	1,640,000
9	Veunsananh	17	143,999,982	2,098,000	250,000	562,000	-	220,000	71,828,000
10	Hatpek	14	65,999,984	235,000	90,000	-	-	-	-
11	Sang	-	-	-	-	-	-	-	-
12	Yangkham	174	244,000,043	25,746,000	2,245,000	5,614,000	2,050,000	462,000	36,976,000
13	Hatkhamhieng	109	222,999,962	2,910,000	1,690,000	14,800,000	11,000,000	864,000	68,055,000
14	Hatxaifong	39	104,999,974	2,372,000	305,000	200,000	-	22,000	2,800,000
15	Navangneua	64	192,500,014	31,802,500	3,354,000	500,000	500,000	-	71,347,000
16	Veunsivilai	77	114,750,046	9,312,000	3,723,000	4,117,145	-	257,295	9,442,000
17	Beung Xe	62	249,314,490	23,819,000	1,336,000	11,200,000	9,000,000	1,530,000	150,107,000
18	Beungbouathong	70	131,999,967	8,200,000	1,597,000	29,770,000	2,900,000	277,410	5,633,000
19	Nasang	51	195,999,951	2,900,000	1,050,000	1,575,100	440,000	85,091	2,543,050
20	Thaphoxai	42	108,999,973	3,322,000	876,500	980,000	-	103,500	3,390,099
21	Nonnakham	63	89,999,978	2,183,000	712,000	778,907	-	66,907	2,230,250
		<b>1,302</b>	<b>3,364,594,037</b>	<b>219,006,900</b>	<b>28,676,500</b>	<b>260,197,152</b>	<b>46,490,000</b>	<b>13,848,203</b>	<b>594,530,399</b>

No.	Village Name	Establishment of Village Development Coordination Committee (VCCCC), Village Auditing Committee (VAC), and Advisory Village Committee (AVC)	Establishment of Saving Fund	Amount of Village Fund Provided by NTPC [Kip]	Number of Participants of Training in Fund Management and Formulation of Business Plans		Land Clearing/Preparation Wet Season Rice		Number of HH Growing Dry Season Crops 2005/06	Number of HH Growing Fish	Number of HH Raising Pigs	Number of HH Growing Wet Season Rice, 2006	Number of HH Growing Wet Season Crops, 2006	Number of HH Introducing Mak Gnao ( <i>Jatropha curcas</i> ) for Biodiesel Production	Number of HH Involved in Trading Activities	Demonstration Farms for Sweet Corn and Chilis	
					Project Management	Saving Fund	Number of HH	Surface Area in Rai								Number of HH	Surface Area in Rai
1	Phathoung	+	+	149,975,046	10	10				3					2		
2	Nongping	+	+	229,935,037	10	10									2	1	1
3	Khoksavang	+	+	161,969,045	10	10									2		
4	Mahaxaitai	+	+	231,249,970	10	10				5	7				24		
5	Povaneua	+	+	220,000,048	10	10				4	19	4		3	5		
6	Povatai	+	+	278,400,434	10	10				3	17				10		
7	Khamfeuang	+	+	118,750,045	10	10				5					16		
8	Kengpe	+	+	108,750,048	10	10								14	3		
9	Veunsananh	+	+	143,999,982	10	10	32	64						3	7		
10	Hatpek	+	+	65,999,984	10	10								10			
11	Sang	+	+	-	-	-											
12	Yangkham	+	+	244,000,043	10	10						6			5	5	2
13	Hatkhamhieng	+	+	222,999,962	10	10					22			8	2		
14	Hatxaifong	+	+	104,999,974	10	10											
15	Navangneua	+	+	192,500,014	10	10				6	4	20			1		
16	Veunsivilai	+	+	114,750,046	10	10									2	5	2
17	Beungxe	+	+	249,314,490	10	10			41	17	14	45	16	8	12	3	2.5
18	Beungbouathong	+	+	131,999,967	10	10								24	5	1	1
19	Nasang	+	+	195,999,951	10	10								15			
20	Thaphoxai	+	+	108,999,973	10	10								39	1		
21	Nonenakham	+	+	89,999,978	10	10									1		
		21	21	3,364,594,037	200	200	32	64	41	43	83	75	16	124	100	15	8.5

## **Environmental Activities**

### 3 Environmental activities

#### 3.1 General

In addition to the monitoring of the HC's construction activities reported in the Construction section of the report, Camp Followers water quality monitoring reported in section 2.1.3, and the PCR activities reported in section 2.1.1, activities and involvement of the Environmental Management Office in November 06 have included the following:

- Water Quality sampling (7-11 November 2006) and analysis.
- Ongoing Interim Human Elephant Conflict (HEC) Monitoring and continued contractual activities for Elephant Program Phase II.
- Received the Inception Report for the Wildlife Management and Monitoring Program.
- NTPC review of WCS bid documents for the environmental education component of the Transitional Strategy.
- Development of the 2<sup>nd</sup> Quarterly Progress Report for the EMU.

#### 3.2 Wildlife Programs

The description of the various elements of the wildlife program is included for reference.

##### 3.2.1 Fish Impacts in upstream and downstream river species

The baseline fish/aquatic species and habitat inventory report was finalized in September.

No special remarks for this reporting period.

##### 3.2.2 Wildlife Management and Monitoring Programme

Given overlaps in baseline survey and management activities, the Terrestrial and Wetland Programs, which are presented separately in the CA, have been combined into one Wildlife Management and Monitoring Program.

The program will be conducted in two phases:

1. Phase I includes (i) the pre-impoundment species and habitat inventories, (ii) development of a post-impoundment species management program, and
2. Phase II includes training the appropriate GOL agency to implement the management plan.

Contractor has been contracted to conduct Phase I. Activities commenced on 30 September 2006 and the baseline survey and wildlife management plan are schedule to be submitted on 31 July 2007.

Activities during November 2006 include:

The Inception Report was received on 25 November 2006 and is under NTPC review. In summary, the Inception Reports presents the following (some of which reiterate the outputs of the post survey debriefing):

- The current species assemblage and habitat quality was compared to previous surveys in the same area 10 years ago. Nam Theun tributary embayments had little habitat degradation. Some species (river lapwing, basking turtle) appear to be doing well. Other species (fish eagle), have probably not declined but this needs to be confirmed during the planned additional survey. However, some species (e.g., otter) appear to be in decline but their decline is likely resulting from wildlife trade rather than through habitat degradation. No visual sighting of the White-winged duck.
- Initial management recommendations were made on the:
  - development of small interim wetlands in the tributary embayments prior to the inundation to act as refuges for wetland species and buffer inundation impacts;
  - development of a wildlife rescue plan for the more endangered/larger species which warrant rescue;

- use regional lessons-learned to feed into the Wildlife Management and Monitoring Plan;
- implementation of reservoir access controls and patrolling;
- investigation of local wildlife trade;
- management measures for salvage logging and construction of the new road.

### 3.2.3 Asian Elephant Program

1. Pre-impoundment inventory and survey of habitats, distribution, movements.
2. Implementation of a pre-Reservoir impoundment elephant management program.
3. Post-Reservoir impoundment monitoring of movements and distribution.
4. Training of local authorities in conflict response and emergency response.
5. Establishment and implementation of an elephant conflict response team.
6. Development of a transitional strategy for reservoir impoundment.
7. Implementation of a reservoir impoundment elephant strategy.
8. Implementation of post impoundment elephant program.

Phase I of the Elephant Program was conducted by Wildlife Conservation Society (WCS) and includes items 1, 4 and 5 above. The draft Final Report for Phase I was submitted on 31 May 2006. A population of 142 (95% CI=97,207) individuals has been estimated based on the line transect and dung decay data. Given delays in the DNA analysis, the Final Report will not be finalized until January 2007.

WCS is the likely consultant to conduct Phase II. Objectives of Phase II include development and implementation of a pre- and post-inundation elephant management plan. Management activities will include the continuation of HEC monitoring and training villagers in passive and active crop protection measures.

Activities during November 2006 include:

- Bid documents have been submitted by WCS and are being reviewed by NTPC. Contractual activities are still ongoing.
- Between the end of Phase I and commencement of Phase II, HEC monitoring is continuing to assess the spatial and temporal distribution of HEC on the Nakai Plateau and surrounding areas. HEC incidents were recorded and tabulated below. Similarly to the previous year there has been a sharp increase in the number of HEC in the period following the wet season when crops are ripening.

Month	HEC Incidents
Jul 06	3
Aug 06	10
Sep 06	18
Oct 06	6
Nov 06	51

### 3.2.4 Transitional Strategy for Reservoir Impoundment

This program includes the following activities:

1. Development of a transitional strategy for reservoir impoundment.
2. Training of local authorities in wildlife emergency response.
3. Establishment and implementation of an emergency response team.
4. Public awareness program.
5. Prevention and prohibition of wildlife trade.

The requirement to provide recommendations on the transitional strategy has been included in the Wildlife Management and Monitoring Program.

Activities during November 2006 include:

- The Wildlife Management and Monitoring Program Inception Report provides initial recommendations on the extent of activities required for the animal rescue activities. These are presented in section 3.2.2 above. The consultant have proposed a person to develop the wildlife rescue plan, with planning activities scheduled to commence in April 2007.
- To instill environmental awareness in the Nakai Plateau population, including Resettlers, and reduce the exploitative approaches to wildlife, especially during the transitional phase when animals may be vulnerable, an environmental education program will be implemented. The education program will be developed by NTPC with GOL providing the education. WCS have submitted Bid Documents to conduct the Environmental Education Process, which are under NTPC review.
- The EMU has identified in its Environmental Management Manual the need for GOL to be responsible for control and enforcement of wildlife protection and prevention of wildlife trade. EMU activities will include (i) assessment of the capacity of GOL enforcement agencies; (ii) assistance to GOL with capacity building; (iii) spot checks to confirm effectiveness of GOL enforcement programs; and (iv) identification of additional measures to improve hunting control (e.g. village level regulations).

### 3.2.5 Adaptive Management Programs

An Adaptive Management approach will be implemented for the following Programs:

1. Wildlife Program (all components)
2. Riparian release downstream of the Nakai Dam
3. Water release in the Nam Kathang
4. Water release from the regulating pond to the downstream channel

No special remarks for this reporting period.

## 3.3 Water Quality Monitoring and Assessment Program

### **October 2006**

During October 2006, the WQMAP included the following monitoring<sup>1</sup>:

- 27 parameters at 16<sup>2</sup> Surface Water sampling sites. These are located upstream and downstream of construction areas on the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit, and Xe Bangfai. Given the potential for Project increases in sediment load, the spatial distribution of turbidity was monitored at 7 surface water sites and at 6 construction site discharges along the Nam Kathang.
- 12 physiochemical and 1 bacteriological parameter at 12 Community Groundwater sampling sites. These are located in Nakai, Gnommalat, and Mahaxai District.
- 12 physiochemical parameters at 15 Resettlers and Project Lands Groundwater sampling site. 1 bacteriological parameter at 30 Resettlers and Project Lands Groundwater sampling sites. These are new groundwater installations located on the Nakai Plateau that have been provided by NTPC.

The laboratory analytical results for October 2006 are presented in the tables below. As a screening procedure, the results have been compared with Project guidelines. Values highlighted in yellow represent exceedences. Comparison of measured values with guidelines is intended as an initial screening step to assist in data interpretation. Exceedences are then considered on a site-specific basis to assess whether a measured value poses an environmental or human health risk. The significant project-related exceedences are discussed below.

<sup>1</sup> Water quality analysis data are presented one month late due to the time taken for the analyses.

<sup>2</sup> SW13 is located on a seasonal water body and therefore monitoring only in wet season. SW10 is located on the Nam Pan which is no longer included in the WQMAP.

## **Surface Water - October 2006**

### **Nam Theun**

- The water quality in the Nam Theun continues to be considered as good with few measured exceedences of the Project Guidelines.
- pH falls below the lower range (pH 6.0) of the Project Guideline throughout the entire length of the Nam Theun, including the upstream control site (SW1), and is therefore not deemed to be significant or Project-related. Acidic water can induce stress in some aquatic species with a specific pH tolerance range. Although the WHO suggests that a pH less than 6.5 would markedly impair the potability of water, there is no health-based WHO guideline for pH. Extreme pH (>11 or <4) can cause irritation of the eyes, skin and mucous membranes. The observed pH in the Nam Theun remained within this range and should not have any health implications for consumers.
- Total iron exceeds the Project Guideline downstream of the Ban Thalang Bridge (SW2) and the Nakai Dam Site (SW3). Although turbidity and TSS remained within their respective Project Guidelines, the measured elevated total iron is consistent with field observations of turbid water at Ban Thalang Bridge, the source of which could not be confirmed during sampling, and highly turbid water being pumped from the downstream coffer dam at Nakai Dam site. For total iron, concentrations of 1-3 mg/l can be acceptable for people to drink but the taste and appearance will usually be affected above this level. There are few communities directly downstream of the Ban Thalang Bridge and Nakai Dam construction areas on the Nam Theun.

### **Nam Kathang**

- With the exception of faecal coliform, the water in the Nam Kathang can be considered good with few exceedences of the Project Guidelines.
- As with the previous month, turbidity and TSS, coupled with nitrogen-nutrients and iron, continue to remain within the Project Guidelines. These within-Guideline levels reflect the reduction in rainfall, and therefore reduced sediment laden runoff from Nakai Plateau construction areas (Saddle Dam 12b, Headrace and Intake), during the dry season, and the ongoing effective sediment control measures at the Power House and Access Adit.
- The slight exceedence of the Project Guideline for pH downstream of RNT (SW9) is not deemed to be significant.
- Given that there are no construction activities along the banks of the Nam Kathang between SW9 and SW14, the elevation of alkalinity at SW14 is not deemed to be Project-related. Elevated alkalinity at SW14 is consistent with previous months and is likely a result of alkaline waters of the Nam Gnom entering the Nam Kathang at Ban Gnommalat.
- Silica exceeds its Project Guideline in the upstream control site (SW4) with a downstream decreasing trend. The exceedence is not deemed to be Project-related but is likely due to an increase in the proportion of groundwater containing mineral solution of silicates.
- Faecal coliforms continue to exceed the Project Guideline at all sampling sites downstream of the Power House (SW5-14). The source of this elevation is likely to be construction workers who are still observed using the surrounding areas as a toilet, although the contributions from (i) RNT WWTP; and (ii) surrounding communities with poor sanitation infrastructure and their livestock cannot be ruled out. Faecal coliforms are indicators the bacteria and pathogen load in the water which poses a risk to human health. Communities should continue with the practice of boiling surface water prior to consumption.

### **Nam Gnom**

- With the exception of faecal coliforms, the water quality in the Nam Gnom continues to be good with few significant exceedences of the Project Guidelines. With the exception of possible Project-related increases in faecal coliform, there is no evidence that construction activities for the Downstream Channel and Nam Gnom Siphon are having a significant impact on the water quality of the Nam Gnom.
- pH exceeds the upper range (pH 8) of the Project Guideline at both site (SW11 & SW12) on the Nam Gnom and therefore not deemed to be Project-related. Elevated pH is likely resulting from an increased proportion of alkaline groundwater, from the limestone karst-dominated catchment, in the surface water flow. The environmental and human health implications are discussed above.
- Alkalinity exceeds the Project Guideline at both sites on the Nam Gnom. Given the exceedence at the upstream control site (SW11), high alkalinity is not deemed to be Project-related. High alkalinity is likely a result of increased groundwater inputs from the limestone karsts which surround the upper Nam Gnom catchment.

- Faecal coliforms exceed the Project Guideline at the downstream site (SW12). Given that there are no construction camps along the banks of the Nam Gnom, the source of this elevation is likely to be the surrounding communities with poor sanitation infrastructure, and their livestock. However, Project-induced increases in faecal coliform cannot be ruled out. The workshop at the Nam Gnom Siphon construction area currently does not have any toilets and it is possible that construction workers are using the surrounding areas, as seen at other construction areas. The human health implications of elevated faecal coliform are discussed above.

#### **Nam Phit**

- The water quality in the Nam Phit can be considered as good with few exceedences of the Project Guideline. At the time of sampling there was no flow at the upstream control (SW13) and therefore no sample collection or analysis was performed. There is no evidence that construction activities for the Downstream Channel are impacting the water quality of the Nam Phit.
- Calcium exceeds its Project Guideline at the downstream site (SW6). The source is likely to be increased groundwater inputs from the limestone karsts which surround the Nam Phit catchment rather than Project-related. Although the exposure of limestone outcrops during the excavation of the Downstream Channel may be contributing to the elevation. There is no health-based WHO drinking water guideline for calcium and therefore the measured level is not deemed to be significant.
- Potassium exceeds its Project Guideline at the downstream site (SW6). Given that there is no result for the upstream control site (SW13) the source of this elevation is difficult to determine. However, it is likely that elevated potassium is being sourced from a higher proportion of groundwater in the dry season surface water flow, and mineral solution in groundwater with a mica containing catchment. Potassium is usually readily removed from solution by plants and clays. Removal of plants and clay from the banks of the Nam Phit during Downstream Channel excavations may be reducing the potassium sink. There is no health-based drinking water guideline for potassium and therefore the measured level is not deemed to be significant.

#### **Xe Bangfai**

- The water quality in the Nam Phit can be considered as good with only one exceedence of the Project Guideline. There is no evidence that construction activities are significantly impacting the Xe Bangfai.
- Calcium exceeds its Project Guideline in the middle Xe Bangfai (SW16). Given that there are no construction activities along the Xe Bangfai between Mahaxai (SW8) and the middle Xe Bangfai (SW16) the source of the elevation is not deemed to be Project-related. The source is likely to be groundwater inputs from the limestone karsts as the Xe Bangfai flows through the Sayphou Xoy ridge. There is no health-based WHO drinking water guideline for calcium and therefore the measured level is not deemed to be significant.

### **Groundwater**

#### **Community Groundwater – October 2006**

The Community Groundwater monitoring is establishing a pre-operations baseline for groundwater already established in the community (i.e., not provided by the Project).

Analytical results for Community Groundwater are presented below and, for comparison, the Lao standard for rural drinking water (Resolution No. 953/MOH (14th July 2003)) which is based on WHO guidelines. Although most of the parameters are within the Lao standard for rural drinking water, pH, turbidity, iron, and faecal coliform levels exceed the Lao standard in some instances. The implications of these exceedences are summarized below:

- Consistent with previous months, water is more acidic than the Lao standard for all groundwater sampling sites. The relatively acidic nature of water reflects the fact that shallow wells are typically recharged from rainwater percolating from the surface and sub-surface run-off, both of which would leach dissolved organic carbon and nutrients from soils. Although the pH of most natural waters is between 6 and 8.5, the observed values are consistent with dissolved carbon dioxide resulting from precipitation and sub-surface run-off infiltrating through the soil and the presence of naturally occurring humic and fulvic acids. In addition, the high bacterial content (see below) and therefore bacterial oxidation will increase the carbon dioxide content and lower the pH. The human health implications are discussed above.



- Turbidity exceeds the Lao standard at GW1, GW6 and GW10. Elevated turbidity may indicate that the structure of the well has been compromised and surface runoff containing suspended solids, and possibly other contaminants, have directly entered the well. Although not directly toxic, the measured turbidity may have an adverse effect on drinking water quality, impacting the appearance, color, odor and taste. Turbidity can also have a significant effect on microbiological quality of drinking water, with increased particulate matter and nutrients stimulating bacterial growth which may contribute to the higher level of faecal coliform recorded at some of these sites.
- Consistent with elevated turbidity, iron exceeds its Lao standard at both GW 6 and GW10. The combined increase in turbidity and iron indicates that surface water containing insoluble ferric oxides has entered the groundwater. However, it is also possible that the near anaerobic conditions resulting from bacterial oxidation have reduced insoluble ferric oxide in unlined wells walls to ferrous iron which is soluble under acidic conditions.
- With the exception of GW9, faecal coliform levels exceed the Lao standard for rural drinking water. This contamination is likely a result of poor well design and management, with faecal contamination entering from the surface where animal feces are usually present. Faecal coliforms are indicators of the bacteria and pathogen load in the water which could pose a risk to human health. Communities should continue with the practice of boiling surface water prior to consumption.

### **Resettlers & Project Lands Groundwater – October 2006**

The Resettlers and Project Lands Groundwater monitoring is determining whether groundwater installations provided by NTPC are of an acceptable quality, and also establishing a pre-operations baseline for groundwater.

Analytical results for Resettlers & Project Lands Groundwater are presented in below. Although most of the parameters are within the Lao standard for rural drinking water, pH, turbidity, and faecal coliform values exceed the Lao standard in some instances. The implications of these exceedences are summarized below:

- The causes and implications of low pH are discussed under the Community Groundwater above.
- Turbidity slightly exceeds the Lao standard at GW9. This elevation may have resulted from carryover slurry during the drilling process. The level is only slightly above the Lao standard and not thought to be significant. The human health implications of elevated turbidity are discussed above.
- Faecal coliforms exceed the Lao standard at GW4 and SW7. The contamination may have resulted from contamination during drilling or the well equipment not being sterilized adequately after well installation. Another source of contamination is people touching the well aperture during washing or food preparation (such as gutting pigs, chickens) activities which have been observed during sampling. A compromised integrity of the pump head skirt cannot be ruled out. The human health implications of faecal coliform contamination are discussed above.

**Table: October 2006 Surface Water Quality in the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit and Xe Bangfai.**

Parameter	Unit	Project Guidelines	River-Specific Guideline	Nam Theun		
				SW 1	SW 2	SW 3
Sampling Date				21/10/06	20/10/06	20/10/06
Sampling Time				10.40 h	12.30 h	10.30 h
Water Depth	(m)			1.9	4.3	0.4
Sampling Method				grab	grab	grab
Air Temperature	(°C)			23.6	27.2	26.3
Cloud Coverage				100	50	70
Water Temperature	(°C)			23.6	24.7	24.8
pH		6.0-8.0		5.77	5.72	5.99
DO	(mg/L)	> 5.0		7.39	8.02	8.44
% DO Saturation	(%)			91.4	102.9	107.1
Conductivity	(µS/cm)	< 350 or <750 *		30.7	29.8	33.9
Turbidity	(NTU)	< 200		8.52	14.8	17.4
Total suspended solids	(mg/L)	< 40 or <80*		8	27.3	19.2
Alkalinity	(mg/L)	- <sup>11</sup>	36.4	18.8	15.6	32.4
Ammonia-nitrogen	(mg/L)	< 0.5		0.186	0.056	0.207
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	< 3.4		0.014	0.036	0.072
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)	< 0.2		ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>
Kjeldahl nitrogen(TKN)	(mg/L)	- <sup>11</sup>	1.030	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Potassium (K)	(mg/L)	- <sup>11</sup>	1.06	0.593	0.638	0.624
Sodium (Na)	(mg/L)	300		1.76	1.80	1.82
Manganese (Mn)	(mg/L)	< 0.5		0.028	0.028	0.042
Total iron (Fe)	(mg/L)	< 1.0		0.742	1.46	1.22
Lead (Pb)	(mg/L)	< 0.05		0.044	0.049	0.036
Calcium (Ca )	(mg/L)	50		5.9	2.5	3.0
Magnesium (Mg)	(mg/L)	< 15		1.18	0.827	0.777
Silica (SiO <sub>2</sub> )	(mg/L)	- <sup>11</sup>	10.3	8.69	9.28	9.28
Sulphate (SO <sub>4</sub> <sup>-2</sup> )	(mg/L)	< 500		0.34	0.43	1.27
Chloride (Cl <sup>-</sup> )	(mg/L)	< 250		1.15	0.77	1.15
Total mercury (Hg)	(mg/L)	< 0.001		ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>
Arsenic (As)	(mg/L)	< 0.05		ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>
BOD	(mg/L)	< 15		0.5	ND <sup>7</sup>	0.7
COD	(mg/L)	< 40		3.08	3.08	ND <sup>8</sup>
Total phosphorus	(mg/L)	< 0.2		0.013	0.027	0.01
Faecal Coliform	(C/100mL)	150		70	48	69

<sup>11</sup> No Project or internationally recognized guideline available therefore the river-specific guideline shall be adopted as the trigger

1 Non-detectable (Detection limit = 0.001 mg/L)

4 Non-detectable (Detection limit = 0.005 mg/L)

6 Non-detectable (Detection limit = 0.0003 mg/L)

2 Non-detectable (Detection limit = 0.16 mg/L)

5 Non-detectable (Detection limit = 0.0002 mg/L)

7 Non-detectable (Detection limit = 2.0 mg/L)

3 Non-detectable (Detection limit = 0.010 mg/L)

Parameters which exceed the Project trigger.

\* 350 µS/cm for Nam Theun; 750 µS/cm for lowlands rivers

\* 40 mg/L for all rivers in all seasons with the exception of 80 mg/L for the Xe Bang Fai in wet season

**Table: October 2006 Surface Water Quality in the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit and Xe Bangfai.**

Parameter	Unit	Project Guidelines	River-Specific Guideline	Nam Kathang					Nam Gnom	
				SW 4	SW5	SW 9	SW 14	SW15	SW 11	SW 12
Sampling Date				18/10/06	18/10/06	18/10/06	17/10/06	18/10/06	18/10/06	18/10/06
Sampling Time				9.25 h	10.42 h	12.00 h	11.35 h	10.15 h	11.20 h	12.35 h
Water Depth	(m)			0.2	0.8	0.7	0.5	1	1.2	1.2
Sampling Method				grab	grab	grab	grab	grab	grab	grab
Air Temperature	(°C)			26.6	27.6	27.7	27.5	24.1	27	27.6
Cloud Coverage				0	0	5	0	0	0	5
Water Temperature	(°C)			25.6	27.1	26.5	27.1	23.6	26.2	27.5
pH		6.0-8.0		7.63	7.73	8.05	7.82	7.41	8.15	8.2
DO	(mg/L)	> 5.0		8.54	8.58	9.11	8.18	8.43	9.21	9.59
% DO Saturation	(%)			163	109.5	114.7	104.1	100.9	115.6	122.4
Conductivity	(µS/cm)	< 350 or <750 *		179.1	240	120.5	251	69	250	245
Turbidity	(NTU)	< 200		4.62	10.67	6.59	8.83	9.1	10.07	11.5
Total suspended solids	(mg/L)	< 40 or <80*		1.0	2.2	1.9	7.4	4.5	2.3	3.7
Alkalinity	(mg/L)	- <sup>11</sup>	133.8	87.2	103	58	140	40.4	144	141
Ammonia-nitrogen	(mg/L)	< 0.5		0.042	0.032	0.057	0.057	0.046	0.088	0.068
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	< 3.4		0.014	0.007	0.014	0.238	0.022	0.288	0.252
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)	< 0.2		ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>
Kjeldahl nitrogen(TKN)	(mg/L)	- <sup>11</sup>	1.089	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Potassium (K)	(mg/L)	- <sup>11</sup>	1.56	0.805	1.31	0.523	0.393	0.456	0.377	0.374
Sodium (Na)	(mg/L)	300		5.51	10.7	5.04	9.58	1.4	0.933	0.914
Manganese (Mn)	(mg/L)	< 0.5		ND <sup>3</sup>	0.025	0.024	0.02	0.014	0.007	0.012
Total iron (Fe)	(mg/L)	< 1.0		0.061	0.242	0.352	0.26	0.412	0.158	0.192
Lead (Pb)	(mg/L)	< 0.05		ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>3</sup>	0.015
Calcium (Ca)	(mg/L)	50		20.9	27.1	13.8	37	10.1	44.9	46.3
Magnesium (Mg)	(mg/L)	< 15		3.77	4.17	1.82	1.88	0.874	1.87	1.97
Silica (SiO <sub>2</sub> )	(mg/L)	- <sup>11</sup>	16.2	19.1	16.3	10.7	9.37	8.15	7.97	7.52
Sulphate (SO <sub>4</sub> <sup>2-</sup> )	(mg/L)	< 500		17.2	26.6	5.29	2.3	0.8	1.46	1.74
Chloride (Cl <sup>-</sup> )	(mg/L)	< 250		0.38	3.06	3.25	1.91	0.38	ND <sup>4</sup>	ND <sup>4</sup>
Total mercury (Hg)	(mg/L)	< 0.001		ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>
Arsenic (As)	(mg/L)	< 0.05		ND <sup>6</sup>	0.0007	ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>	0.0004
BOD	(mg/L)	< 15		ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>7</sup>	0.9	ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>7</sup>
COD	(mg/L)	< 40		3.08	6.16	12.3	12.4	12.3	15.4	6.16
Total phosphorus	(mg/L)	< 0.2		0.017	0.023	ND <sup>9</sup>	0.02	ND <sup>9</sup>	0.01	0.013
Faecal Coliform	(C/100mL)	150		98	284	256	234	51	68	214

<sup>11</sup> No Project or internationally recognized guideline available therefore the river-specific guideline shall be adopted as the trigger

<sup>1</sup> Non-detectable (Detection limit = 0.001 mg/L)

<sup>2</sup> Non-detectable (Detection limit = 0.16 mg/L)

<sup>3</sup> Non-detectable (Detection limit = 0.010 mg/L)

<sup>4</sup> Non-detectable (Detection limit = 0.005 mg/L)

<sup>5</sup> Non-detectable (Detection limit = 0.0002 mg/L)

<sup>6</sup> Non-detectable (Detection limit = 0.0003 mg/L)

<sup>7</sup> Non-detectable (Detection limit = 2.0 mg/L)

<sup>9</sup> Non-detectable (Detection limit = 0.0003 mg/L)

<sup>9</sup> Non-detectable (Detection limit = 2.0 mg/L)

\* 350 µS/cm for Nam Theun; 750 µS/cm for lowlands rivers

\* 40 mg/L for all rivers in all seasons with the exception of 80 mg/L for the Xe Bangfai in wet season

**Table: October 2006 Surface Water Quality in the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit and Xe Bangfai.**

Parameter	Unit	Project Guidelines	River- Specific Guideline	Nam Phit	River- Specific Guideline	Xe Bangfai			
				SW 6		SW7	SW8	SW16	SW 17
Sampling Date				17/10/06		17/10/06	17/10/06	19/10/06	19/10/06
Sampling Time				13.42 h		10.25 h	14.09 h	11.20 h	12.47 h
Water Depth	(m)			3.5		5.8	6.2	4.6	5.2
Sampling Method				grab		grab	grab	grab	grab
Air Temperature	(°C)			27.7		26	26.3	26.1	31.2
Cloud coverage				5		5	10	40	60
Water Temperature	(°C)			27		25.2	26.3	26.2	27.7
pH		6.0-8.0		7.48		7.68	7.76	7.76	7.82
DO	(mg/L)	> 5.0		5.19		7.31	7.33	9.79	9.87
% DO Saturation	(%)			66.8		90.2	91.8	123.7	126.4
Conductivity	(µS/cm)	< 350 or <750 *		376		315	311	315	288
Turbidity	(NTU)	< 200		17		19.3	19.6	14.5	9.09
Total suspended solids	(mg/L)	< 40 or <80*		10.7		20.6	27.3	18.2	5.7
Alkalinity	(mg/L)	~11	252.6	221	200.6	179	180	178	164
Ammonia-nitrogen (NH <sub>3</sub> -N)	(mg/L)	< 0.5		0.056		0.05	0.124	0.104	0.058
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	< 3.4		0.36		0.432	0.425	0.346	0.281
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)	< 0.2		ND <sup>1</sup>		ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>
Kjeldahl nitrogen(TKN)	(mg/L)	~11	0.688	ND <sup>2</sup>	0.559	0.343	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Potassium (K)	(mg/L)	~11	0.19	0.298	0.68	0.295	0.297	0.303	0.37
Sodium (Na)	(mg/L)	300		1.12		1.10	1.14	1.07	1.11
Manganese (Mn)	(mg/L)	< 0.5		0.032		0.012	0.024	0.026	0.015
Total iron (Fe)	(mg/L)	< 1.0		0.498		0.725	0.776	0.478	0.25
Lead (Pb)	(mg/L)	< 0.05		ND <sup>4</sup>		ND <sup>3</sup>	ND <sup>3</sup>	0.022	0.063
Calcium (Ca )	(mg/L)	50		63.1		44	48.1	53.4	46.8
Magnesium (Mg)	(mg/L)	< 15		6.13		3.73	3.78	4.13	4.48
Silica (SiO <sub>2</sub> )	(mg/L)	~11	8.8	6.8	10.5	7.79	7.75	7.75	8.24
Sulphate (SO <sub>4</sub> <sup>-2</sup> )	(mg/L)	< 500		2.02		2.49	2.3	2.39	2.11
Chloride (Cl <sup>-</sup> )	(mg/L)	< 250		0.19		1.15	0.77	0.19	0.96
Total mercury (Hg)	(mg/L)	< 0.001		ND <sup>5</sup>		ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>
Arsenic (As)	(mg/L)	< 0.05		ND <sup>6</sup>		ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>
BOD	(mg/L)	< 15		1.0		0.8	0.8	ND <sup>7</sup>	ND <sup>7</sup>
COD	(mg/L)	< 40		9.33		9.33	12.4	6.16	3.08
Total phosphorus	(mg/L)	< 0.2		0.023		0.02	0.027	0.023	0.013
Faecal Coliform	(C/100mL)	150		43		41	51	22	6

<sup>11</sup> No Project or internationally recognized guideline available therefore the river-specific guideline shall be adopted as the trigger

1 Non-detectable (Detection limit = 0.001 mg/L)

2 Non-detectable (Detection limit = 0.16 mg/L)

3 Non-detectable (Detection limit = 0.010 mg/L)

Parameters which exceed the Project trigger.

4 Non-detectable (Detection limit = 0.005 mg/L)

5 Non-detectable (Detection limit = 0.0002 mg/L)

6 Non-detectable (Detection limit = 0.0003 mg/L)

7 Non-detectable (Detection limit = 2.0 mg/L)

\* 350 µS/cm for Nam Theun; 750 µS/cm for lowlands rivers

\* 40 mg/L for all rivers in all seasons with the exception of 80 mg/L for the Xe Bang Fai in wet season

**Table: Community Groundwater analytical results**

Parameter	Unit	Lao Standard	GW1	GW2	GW3	GW4	GW5	GW6
Sampling Date			23/10/06	23/10/06	23/10/06	23/10/06	23/10/06	23/10/06
Sampling Time			7.13 h	7.40 h	8.20 h	9.10 h	10.50 h	11.40 h
Water Depth	(m)		10.0	10.0	8.0	-	-	14.0
Sampling Method			grab	grab	grab	grab	grab	grab
Air Temperature	(°C)		-	-	-	-	-	-
Water Temperature	(°C)	-	23.6	24.5	26.6	26.3	27.9	-
Odor		Acceptable	Normal	Normal	Normal	Normal	Normal	Normal
pH		6.5-8.5	4.99	4.79	4.42	4.61	4.88	4.61
DO	(mg/L)	-	3.18	3.08	2.37	2.99	2.12	1.04
% DO Saturation	(%)	-	39.4	39.0	29.9	37.6	28.8	14.3
Conductivity	(µS/cm)	1000	51.6	22.8	44.2	38.3	64.8	31.7
Turbidity	(NTU)	<10	17.3	8.12	2.14	7.92	1.68	29.1
Total Hardness	(mg/L)	<500	14.1	9.4	9.4	12.2	11.3	3.8
Fluoride	(mg/L)	<1.5	0.11	0.10	0.09	0.09	0.07	0.07
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	40	2.35	0.613	1.64	1.33	2.96	0.017
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)		ND <sup>1</sup>	ND <sup>1</sup>	0.007	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>
Arsenic (As)	(mg/L)	<0.05	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Iron (Fe)	(mg/L)	<1	0.512	0.212	0.102	0.129	ND <sup>3</sup>	1.36
Manganese (Mn)	(mg/L)	<0.5	0.238	0.112	0.060	0.030	0.031	0.019
Faecal Coliform	FC/100 mL	0	9	3	24	11	11	17

**Table: Community Groundwater analytical results (cont.)**

Parameter	Unit	Lao Standard	GW7	GW8	GW9	GW10	GW11	GW12
Sampling Date			23/10/06	23/10/06	23/10/06	23/10/06	23/10/06	23/10/06
Sampling Time			9.50 h	10.20 h	10.36 h	11.25 h	14.05 h	15.00 h
Water Depth	(m)		-	4.5	-	-	22.0	-
Sampling Method			grab	grab	grab	grab	grab	grab
Air Temperature	(°C)		-	-	-	-	-	-
Water Temperature	(°C)	-	27.1	26.3	28.4	26.3	27.4	29.2
Odor		Acceptable	Normal	Normal	Normal	Normal	Normal	Normal
pH		6.5-8.5	4.89	5.76	4.55	4.27	6.43	5.94
DO	(mg/L)	-	2.65	3.63	3.41	2.54	2.86	0.83
% DO Saturation	(%)	-	34.1	45.5	44.8	32.5	47	10.7
Conductivity	(µS/cm)	1000	134.2	28.7	49.6	57.5	487	239
Turbidity	(NTU)	<10	3.41	9.62	2.52	75.3	4.16	3.36
Total Hardness	(mg/L)	<500	32.9	16.0	16.9	9.4	208	8.5
Fluoride	(mg/L)	<1.5	0.06	0.05	0.05	0.05	0.07	0.08
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	40	6.47	0.109	4.30	0.403	0.076	0.420
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)		ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>
Arsenic (As)	(mg/L)	<0.05	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Iron (Fe)	(mg/L)	<1	0.071	0.474	0.102	1.13	0.064	0.078
Manganese (Mn)	(mg/L)	<0.5	0.222	0.222	0.056	0.021	0.028	0.358
Faecal Coliform	FC/100 mL	0	6	26	0	4	11	5

<sup>1</sup> Non-detectable (Detection limit = 0.001 mg/L)<sup>2</sup> Non-detectable (Detection limit = 0.0003 mg/L)

**Table: Resettlers and Project Lands Groundwater Analytical Results**

Parameter	Unit	Lao Standard <sup>1</sup>	RGW1	RGW2	RGW3	RGW4	RGW5	RGW6	RGW7	RGW8
Sampling Date			22/10/06	22/10/06	22/10/06	22/10/06	22/10/06	22/10/06	22/10/06	22/10/06
Sampling Time			10.14 h	10.27 h	10.50 h	11.08 h	11.20 h	11.44 h	12.04 h	12.14 h
Water Depth	(m)		40.0	43.0	55.0	55.0	55.0	30.0	30.0	61.0
Sampling Method			grab	grab	grab	grab	grab	grab	grab	grab
Air Temperature	(°C)	-	-	-	-	-	-	-	-	-
Water Temperature	(°C)	-	24.9	25.0	25.5	25.6	25.6	24.1	24.5	24.1
Odor		Acceptable	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
pH		6.5-8.5	5.94	6.35	7.01	6.15	5.18	5.73	5.46	6.59
DO	(mg/L)	-	2.48	2.52	2.99	2.76	2.10	2.02	2.88	2.20
% DO Saturation	(%)	-	31.9	33.7	39.0	36.4	27.4	25.6	36.7	27.5
Conductivity	(µS/cm)	1000	126.4	269	392	164.4	32.3	95.7	45.5	379
Turbidity	(NTU)	<10	1.89	2.54	1.54	1.74	1.77	2.66	2.12	2.03
Total Hardness	(mg/L)	<500	48.8	135	191	79.8	16.9	41.3	22.5	192
Fluoride	(mg/L)	<1.5	0.15	0.15	0.13	0.15	0.11	0.06	0.11	0.11
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	40	1.61	0.025	ND <sup>1</sup>	0.546	0.353	0.084	0.008	0.008
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)		ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Arsenic (As)	(mg/L)	<0.05	ND <sup>3</sup>	ND <sup>3</sup>	0.0006	ND <sup>3</sup>	0.0003	0.0006	0.0006	0.0007
Iron (Fe)	(mg/L)	<1	0.062	0.098	0.056	0.028	0.016	0.290	0.033	0.080
Manganese (Mn)	(mg/L)	<0.5	0.162	0.024	ND	0.022	0.049	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>
Faecal Coliform	FC/100 mL	0	0	0	0	5	0	0	6	0

<sup>1</sup> taken from Resolution No.895/MOH (14th July 2003)<sup>1,2</sup> Non-detectable (Detection limit = 0.001 mg/L)<sup>3</sup> Non-detectable (Detection limit = 0.0003 mg/L)<sup>4</sup> Non-detectable (Detection limit = 0.016 mg/L)<sup>5</sup> Non-detectable (Detection limit = 0.014 mg/L)

**Table: Resettlers and Project Lands Groundwater Analytical Results (cont.)**

Parameter	Unit	Lao Standard	RGW9	RGW10	RGW11	RGW12	RGW13	RGW14	RGW15
Sampling Date			22/10/06	22/10/06	22/10/06	22/10/06	22/10/06	22/10/06	22/10/06
Sampling Time			10.40 h	12.26 h	12.44 h	12.55 h	9.00 h	9.22 h	9.40 h
Water Depth	(m)		64.0	52.0	40.0	46.0	45.0	40.0	61.0
Sampling Method			grab	grab	grab	grab	grab	grab	grab
Air Temperature	(°C)								
Water Temperature	(°C)	-	24.4	24.5	24.2	24.4	23.0	23.3	24.0
Odor		Acceptable	Normal	Normal	Normal	Normal	Normal	Normal	Normal
pH		6.5-8.5	6.65	6.54	6.58	5.94	7.01	4.59	6.56
DO	(mg/L)	-	2.33	1.74	1.90	2.12	2.75	2.69	2.52
% DO Saturation	(%)	-	29.5	22.2	24.1	26.6	34.1	33.8	32.4
Conductivity	(µS/cm)	1000	387	401	328	11.2	507	17.5	362
Turbidity	(NTU)	<10	10.49	3.56	1.51	3.85	2.34	1.88	2.44
Total Hardness	(mg/L)	<500	169	208	139	54.4	347	15.0	186
Fluoride	(mg/L)	<1.5	0.15	0.11	0.13	0.11	0.21	0.09	0.13
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	40	ND <sup>1</sup>	0.042	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	0.050	ND <sup>1</sup>
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)		ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Arsenic (As)	(mg/L)	<0.05	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>
Iron (Fe)	(mg/L)	<1	0.225	0.282	0.148	0.044	ND <sup>4</sup>	0.128	ND <sup>4</sup>
Manganese (Mn)	(mg/L)	<0.5	ND <sup>5</sup>	0.084	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>
Faecal Coliform	FC/100 mL	0	0	0	0	0	0	0	0

<sup>1</sup> taken from Resolution No.895/MOH (14th July 2003)

<sup>1,2</sup> Non-detectable (Detection limit = 0.001 mg/L)

<sup>3</sup> Non-detectable (Detection limit = 0.0003 mg/L)

<sup>4</sup> Non-detectable (Detection limit = 0.016 mg/L)

<sup>5</sup> Non-detectable (Detection limit = 0.014 mg/L)



## November 2006

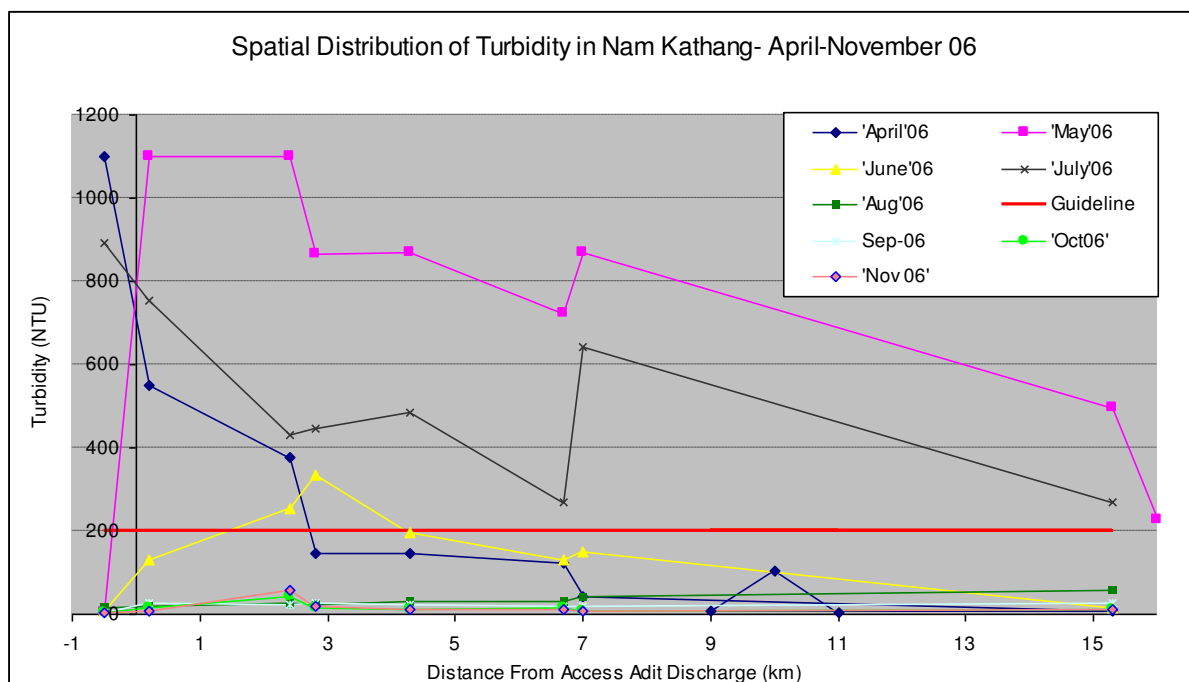
During November 2006, the WQMAP included the following monitoring:

- 27 parameters at 16<sup>3</sup> Surface Water sampling sites. These are located upstream and downstream of construction areas on the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit, and Xe Bangfai. Given the potential for Project increases in sediment load, the spatial distribution of turbidity was monitored at 7 surface water sites and at 6 construction site discharges along the Nam Kathang.
- Faecal coliform analysis for 30 Resettlers & Project Lands Groundwater sites.
- No physio-chemical analysis of groundwater was conducted in November 2006.

## Field Observations - November 2006

Sample collection and field analyses were conducted during 7-11 November 2006. The major field observations and measurements are as follows:

- The turbidity in the Nam Kathang continues to remain within the Project Guideline which reflects the reduction in rainfall and surface runoff from cleared construction areas during the dry season. Improvements in sedimentation controls at the Access Adit and Power House have contributed to the improved water quality in the Nam Kathang.
- Turbidity levels are within the Project guideline for the entire length of the upper Nam Kathang from upstream of the Power House to Ban Gnommalat.
- There was no discharge from the Access Adit Platform 415 sedimentation basins during sampling.
- Discharge from the Power House and Access Adit Platform 415 sedimentation basins was 42.8 and 39.6 NTU, respectively.
- The turbidity of the discharge directed down the Nakai escarpment from Saddle Dam 12b was 86.2 NTU. There was no discharge from the Headrace Channel and Intake Structure construction areas during sampling.



<sup>3</sup> SW13 is located on a seasonal water body and therefore monitoring only in wet season. SW10 is located on the Nam Pan which is no longer included in the WQMAP.



### Turbidity Sampling sites

## November 2006 Water Quality Results

The laboratory analytical results for November 2006 are presented in the tables below. As a screening procedure, the results have been compared with Project guidelines. Values highlighted in yellow represent exceedences. Comparison of measured values with guidelines is intended as an initial screening step to assist in data interpretation. Exceedences are then considered on a site-

specific basis to assess whether a measured value poses an environmental or human health risk. The significant project-related exceedences are discussed below.

### **Surface Water – November 2006**

#### **Nam Theun**

- The water quality in the Nam Theun continues to be considered as good with few significant exceedences of the Project Guidelines.
- pH slightly exceeds the lower range of its guideline in the upstream control (SW1) and is therefore not deemed to be significant or Project related. The potential environmental and human health implications of a low pH are discussed above.
- Silica exceeds its river-specific guideline for the entire length of the Nam Theun, including the upstream control site (SW1) and is therefore not deemed to be Project related. There are no WHO guidelines for drinking water or environmental health-based guidelines for silica.

#### **Nam Kathang**

- With the exception of faecal coliform, the water in the Nam Kathang can be considered as good with few exceedences of the Project Guidelines.
- Turbidity and TSS, coupled with nitrogen-nutrients and iron, continue to remain within the Project Guidelines.
- The slight exceedence of the Project Guideline for pH downstream of RNT (SW9) is not deemed to be significant or threat to environmental or human health.
- Given that no construction sites or camps are located on the Nam Kathang between SW9 and SW14, the exceedence of alkalinity in the lower Nam Kathang (SW14) is not deemed to be significant or Project-related. Elevated alkalinity at SW14 is consistent with previous months and is likely a result of alkaline waters of the Nam Gnom entering the Nam Kathang at Ban Gnommalat.
- Silica exceeds its river specific guideline at the upstream control (SW4) and downstream of the Power House (SW5) with a slight downstream decreasing trend. Given that silica exceeds its guideline in the upstream control, the elevated levels are not deemed to be Project-related.
- Faecal coliform exceeds the Project Guideline at all sampling sites with the exception of downstream of the Power House (SW5). The spatial distribution of faecal coliform is inconsistent with previous months when lower levels of faecal coliform are measured at the upstream control (SW4) compared to downstream sites. Given that there are few communities and livestock upstream of SW4, the measured levels indicate that there may have been a sampling error. The source of the elevation downstream of RNT (SW9) is likely to be Project-related although the surrounding communities with poor sanitation infrastructure and their livestock cannot be ruled out. Given that there are no construction camps on the lower Nam Kathang to elevation at SW14 is likely to be community based. Faecal coliform are indicators the bacteria and pathogen load in the water which could pose a risk to human health. Communities should continue with the practice of boiling surface water prior to consumption.

#### **Nam Gnom**

- With the exception of faecal coliform, the water quality in the Nam Gnom continues to be considered as good with few significant exceedences of the Project Guidelines.
- Alkalinity and calcium both exceed their respective Project Guideline at both sites on the Nam Gnom with a slight downstream decreasing trend observed in both parameters. Given the exceedences at the upstream control (SW11), high calcium and alkalinity is not deemed to be Project-related. High calcium and alkalinity is likely a result of increased groundwater inputs from the limestone karsts which surround the upper Nam Gnom catchment.
- Coupled with an elevated alkalinity, pH slightly exceeds the upper range of the Project Guideline but is not thought to be either significant or Project related.
- Faecal coliform exceeds the Project Guideline at the upstream control site (SW11) and therefore not deemed to be Project-related. The source of this exceedence is likely the poor sanitation infrastructure and livestock of Ban That. The human health implications of elevated faecal coliform are discussed above.

**Nam Phit**

- The water quality in the Nam Phit can be considered as good with few exceedences of the Project Guideline. There was no flowing water at the upstream control (SW13) at the time of sampling and therefore no sample collection or analysis was performed.
- Dissolved oxygen falls below the Project Guideline of 5 mg/L. Low dissolved oxygen have been measured in the Nam Phit prior to any construction activities and therefore the cause of this reduction is deemed to be a combination of high temperature, sluggish dry season flow and oxidation of organic matter rather than being Project related. Additional inputs of oxidizable matter into the Nam Phit from Downstream Channel excavation activities may also be contributing. Low dissolved oxygen will cause some fish species to move away and probably seek dry season refuge in the Xe Bangfai. There is no WHO drinking guideline for dissolved oxygen but anoxic conditions can result in the release of compounds which are potentially toxic or unpleasant to humans. The measures levels in the Nam Phit are however not anoxic.
- Calcium exceeds its Project Guideline at the downstream site (SW6). The source is likely to be increased groundwater inputs from the limestone karsts which surround the Nam Phit catchment rather than Project-related. Although the exposure of limestone outcrops during the excavation of the Downstream Channel may be contributing to the elevation. There is no health-based WHO drinking water guideline for calcium and therefore the measured level is not deemed to be significant.
- Potassium exceeds its Project Guideline at the downstream site (SW6). Given that there is no result for the upstream control site (SW13) the source of this elevation is difficult to determine. However, it is likely that elevated potassium is being sourced from a higher proportion of groundwater in the dry season surface water flow, and mineral solution in groundwater with a mica containing catchment. Potassium is usually readily removed from solution by plants and clays. Removal of plants and clay from the banks of the Nam Phit during Downstream Channel excavations may be reduce the potassium sink. There is no health-based drinking water guideline for potassium and therefore the measured level is not deemed to be significant.

**Xe Bangfai**

- The water quality of the Xe Bangfai can be considered as good with no exceedences of the Project guideline. The results indicate that construction activities are having no significant impact on the water quality of the Xe Bangfai.

**Groundwater****Community Groundwater – November 2006**

No special remarks for this reporting period.

**Resettlers & Project Lands Groundwater – November 2006**

The Resettlers and Project Lands Groundwater monitoring is determining whether groundwater installations provided by NTPC are of an acceptable quality, and also establishing a pre-operations baseline for groundwater.

No physio-chemical parameters were analyzed in November 2006.

Faecal coliform was analyzed in 30 Resettlers & Project Lands Groundwater sites and the results are presented below. The implications of any exceedences are summarized below:

- Faecal coliform exceeds its Lao standard at several groundwater sites. The contamination may have resulted from contamination during drilling or the well equipment not being sterilized adequately after well installation. Another source of contamination is people touching the well aperture during washing or food preparation (such as gutting pigs, chickens) activities which have been observed during sampling. A compromised integrity of the pump head skirt cannot be ruled out. The human health implications of faecal coliform contamination are discussed above. In order to identify the source of the contamination, during the next sampling event samples will be taken before and after the well aperture is sterilized with ethanol.



**Table: November 2006 Surface Water Quality in the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit and Xe Bangfai.**

Parameter	Unit	WQ Guidelines	River- Specific Guideline	Nam Theun			
				SW 1	SW 2	SW3	SW 18
Sampling Date				11/11/2006	11/11/2006	10/11/2006	10/11/2006
Sampling Time				10.08 h	11.36 h	11.25 h	10.50 h
Water Depth	(m)			2.5	2.1	8	0.4
Sampling Method				grab	grab	grab	grab
Air Temperature	(°C)			23.6	23.4	25.1	26.6
Cloud Coverage				40	60	15	10
Water Temperature	(°C)			23.6	24.2	24.1	24.9
pH		6.0-8.0		5.96	6.12	6.65	6.68
DO	(mg/L)	> 5.0		8.76	8.75	8.75	8.98
% DO Saturation	(%)			108.2	110.3	112.1	111.3
Conductivity	(µS/cm)	< 350 or <750 *		36.7	41.8	44.1	40
Turbidity	(NTU)	< 200		5.88	11.5	5.34	5.52
Total suspended solids	(mg/L)	< 40 or <80*		4.0	7.9	ND <sup>1</sup>	2.7
Alkalinity	(mg/L)	- <sup>11</sup>	36.4	18.7	17.9	17.1	17.5
Ammonia-nitrogen	(mg/L)	< 0.5		0.023	0.046	0.069	0.062
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	< 3.4		0.193	0.109	0.118	0.126
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)	< 0.2		ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>
Kjeldahl nitrogen(TKN)	(mg/L)	- <sup>11</sup>	1.030	ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>4</sup>
Potassium (K)	(mg/L)	- <sup>11</sup>	1.06	0.723	0.711	0.672	0.667
Sodium (Na)	(mg/L)	300		2.38	2.42	2.28	2.14
Manganese (Mn)	(mg/L)	< 0.5		0.012	0.022	0.042	0.03
Total iron (Fe)	(mg/L)	< 1.0		0.346	0.476	0.438	0.438
Lead (Pb)	(mg/L)	< 0.05		ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>
Calcium (Ca )	(mg/L)	50		2.88	2.58	2.78	2.74
Magnesium (Mg)	(mg/L)	< 15		0.838	0.788	0.738	0.738
Silica (SiO <sub>2</sub> )	(mg/L)	- <sup>11</sup>	10.3	13	11.6	12.4	11.5
Sulphate (SO <sub>4</sub> <sup>-2</sup> )	(mg/L)	< 500		2.3	1.74	1.83	1.83
Chloride (Cl <sup>-</sup> )	(mg/L)	< 250		1.91	2.58	1.82	1.72
Total mercury (Hg)	(mg/L)	< 0.001		ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>
Arsenic (As)	(mg/L)	< 0.05		ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>7</sup>
BOD	(mg/L)	< 15		ND <sup>8</sup>	0.5	0.5	ND <sup>8</sup>
COD	(mg/L)	< 40		3.17	ND <sup>9</sup>	ND <sup>9</sup>	ND <sup>9</sup>
Total phosphorus	(mg/L)	< 0.2		0.043	0.037	0.013	ND <sup>10</sup>
Faecal Coliform	(C/100mL)	150		6	17	24	69

1 Non-detectable (Detection limit = 0.001 mg/L)

2 Non-detectable (Detection limit = 0.16 mg/L)

3 Non-detectable (Detection limit = 0.010 mg/L)

4 Non-detectable (Detection limit = 0.005 mg/L)

5 Non-detectable (Detection limit = 0.0002 mg/L)

6 Non-detectable (Detection limit = 0.0003 mg/L)

7 Non-detectable (Detection limit = 2.0 mg/L)

<sup>11</sup> No Project or internationally recognized guideline available therefore the river-specific guideline shall be adopted as the trigger

Parameters which exceed the Project trigger.

\* 350 µS/cm for Nam Theun; 750 µS/cm for lowlands rivers

\* 40 mg/L for all rivers in all seasons with the exception of 80 mg/L for the Xe Bangfai in wet season

**Table: November 2006 Surface Water Quality in the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit and Xe Bangfai.**

Parameter	Unit	WQ Guidelines	River- Specific Guideline	Nam Kathang					Nam Gnom	
				SW 4	SW5	SW 9	SW 14	SW15	SW 11	SW 12
Sampling Date				8/11/2006	8/11/2006	8/11/2006	7/11/2006	8/11/2006	8/11/2006	8/11/2006
Sampling Time				9.25 h	10.30 h	11.44 h	11.00 h	10.04 h	11.00 h	12.25 h
Water Depth	(m)			0.2	0.6	0.9	1	0.5	1	0.8
Sampling Method				grab	grab	grab	grab	grab	grab	grab
Air Temperature	(°C)			23.7	25.6	24.5	24.3	22.6	24.2	24.8
Cloud Coverage				0	30	10	20	10	50	95
Water Temperature	(°C)			22	23.5	24.9	24.9	20.7	25	25
pH		6.0-8.0		7.82	7.46	8.11	7.4	6.81	8.07	8.08
DO	(mg/L)	> 5.0		9.83	9.92	9.37	9.1	8.7	10.57	9.66
% DO Saturation	(%)			114.2	117.7	113.5	109.8	99.3	127.5	115.3
Conductivity	(µS/cm)	< 350 or <750 *		225	310	139.9	310	111.6	334	323
Turbidity	(NTU)	< 200		2.63	11.1	6.31	4.9	4.74	4.58	3.06
Total suspended solids	(mg/L)	< 40 or <80*		1	3.4	7.4	2.7	3.6	3.5	1.8
Alkalinity	(mg/L)	- <sup>11</sup>	133.8	91.4	114	75.9	173	50.3	175	170
Ammonia-nitrogen	(mg/L)	< 0.5		0.024	0.032	0.031	0.058	0.066	0.071	0.072
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	< 3.4		ND <sup>2</sup>	0.008	ND <sup>2</sup>	0.193	0.017	0.235	0.21
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)	< 0.2		ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>1</sup>	ND <sup>1</sup>
Kjeldahl nitrogen(TKN)	(mg/L)	- <sup>11</sup>	1.089	0.22	0.22	ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Potassium (K)	(mg/L)	- <sup>11</sup>	1.56	0.722	1.4	0.277	0.329	0.598	0.298	0.3
Sodium (Na)	(mg/L)	300		6.8	17.9	8.84	3.03	2.49	0.681	0.691
Manganese (Mn)	(mg/L)	< 0.5		0.008	0.016	0.012	0.015	0.014	0.016	0.008
Total iron (Fe)	(mg/L)	< 1.0		0.038	0.202	0.251	0.176	0.236	0.113	0.100
Lead (Pb)	(mg/L)	< 0.05		0.022	0.043	0.02	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>3</sup>	ND <sup>3</sup>
Calcium (Ca )	(mg/L)	50		23.1	27.6	18.3	44.6	12.2	54.6	51.6
Magnesium (Mg)	(mg/L)	< 15		4.04	4.29	2.34	1.81	1.04	1.79	1.79
Silica (SiO <sub>2</sub> )	(mg/L)	- <sup>11</sup>	16.2	20.5	19.3	13.8	9.23	8.33	8.24	8.15
Sulphate (SO <sub>4</sub> <sup>-2</sup> )	(mg/L)	< 500		28.6	46.6	31.4	4.64	3.14	2.95	1.27
Chloride (Cl <sup>-</sup> )	(mg/L)	< 250		0.38	6.6	7.66	2.87	2.3	0.87	0.96
Total mercury (Hg)	(mg/L)	< 0.001		ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>6</sup>	ND <sup>5</sup>	ND <sup>5</sup>
Arsenic (As)	(mg/L)	< 0.05		ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>6</sup>	0.0015
BOD	(mg/L)	< 15		ND <sup>8</sup>	ND <sup>8</sup>	ND <sup>8</sup>	0.8	0.5	ND <sup>7</sup>	ND <sup>7</sup>
COD	(mg/L)	< 40		3.24	9.73	13	ND <sup>9</sup>	19.5	13	16.2
Total phosphorus	(mg/L)	< 0.2		0.01	0.023	ND <sup>10</sup>	0.013	ND <sup>10</sup>	0.013	ND <sup>9</sup>
Faecal Coliform	(C/100mL)	150		480	74	115	214	42	621	26

<sup>11</sup> No Project or internationally recognized guideline available therefore the river-specific guideline shall be adopted as the trigger

1 Non-detectable (Detection limit = 0.001 mg/L)

2 Non-detectable (Detection limit = 0.16 mg/L)

3 Non-detectable (Detection limit = 0.010 mg/L)

Parameters which exceed the Project trigger.

4 Non-detectable (Detection limit = 0.005 mg/L)

5 Non-detectable (Detection limit = 0.0002 mg/L)

6 Non-detectable (Detection limit = 0.0003 mg/L)

7 Non-detectable (Detection limit = 2.0 mg/L)

\* 350 µS/cm for Nam Theun; 750 µS/cm for lowlands rivers

\* 40 mg/L for all rivers in all seasons with the exception of 80 mg/L for the Xe Bangfai in wet season

**Table: November 2006 Surface Water Quality in the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit and Xe Bangfai.**

Parameter	Unit	WQ Guidelines	River- Specific Guideline	Nam Phit	River- Specific Guideline	Xe Bangfai			
				SW 6		SW7	SW8	SW16	SW 17
Sampling Date				7/11/2006		7/11/2006	7/11/2006	9/11/2006	9/11/2006
Sampling Time				12.18 h		10.00 h	13.45 h	10.30 h	11.45 h
Water Depth	(m)			0.8		1	2	3.6	4.5
Sampling Method				grab		grab	grab	grab	grab
Air Temperature	(°C)			24		23.5	25.4	24.9	26.5
Cloud coverage				60		10	70	40	60
Water Temperature	(°C)			25.9		24.7	25.7	25.3	26.6
pH		6.0-8.0		7.01		7.68	6.95	7.49	8.00
DO	(mg/L)	> 5.0		4.59		7.95	8.24	8.13	7.77
% DO Saturation	(%)			57.3		96.5	102.6	99.8	98.4
Conductivity	(µS/cm)	< 350 or <750 *		405		324	330	333	314
Turbidity	(NTU)	< 200		11.6		3.18	3.9	3.99	8.71
Total suspended solids	(mg/L)	< 40 or <80*		12.5		2.9	4.4	4.1	8.2
Alkalinity	(mg/L)	- <sup>11</sup>	252.6	233		200.6	188	188	183
Ammonia-nitrogen (NH <sub>3</sub> -N)	(mg/L)	< 0.5		0.028		0.05	0.031	0.056	0.073
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	< 3.4		0.277		0.109	0.126	0.143	0.092
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)	< 0.2		ND <sup>1</sup>		ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>
Kjeldahl nitrogen(TKN)	(mg/L)	- <sup>11</sup>	0.688	0.34		0.559	0.45	ND <sup>2</sup>	ND <sup>2</sup>
Potassium (K)	(mg/L)	- <sup>11</sup>	0.19	0.193		0.68	0.361	0.325	0.404
Sodium (Na)	(mg/L)	300		0.443			1.45	1.50	1.38
Manganese (Mn)	(mg/L)	< 0.5		0.03			0.008	0.008	0.014
Total iron (Fe)	(mg/L)	< 1.0		0.396			0.106	0.155	0.182
Lead (Pb)	(mg/L)	< 0.05		ND <sup>3</sup>			0.014	ND <sup>3</sup>	ND <sup>3</sup>
Calcium (Ca )	(mg/L)	50		57.1			46.4	44.8	49.0
Magnesium (Mg)	(mg/L)	< 15		5.16			3.31	3.16	3.99
Silica (SiO <sub>2</sub> )	(mg/L)	- <sup>11</sup>	8.8	7.7		10.5	9.01	8.83	8.6
Sulphate (SO <sub>4</sub> <sup>2-</sup> )	(mg/L)	< 500		ND <sup>4</sup>			4.36	2.58	3.51
Chloride (Cl <sup>-</sup> )	(mg/L)	< 250		0.77			0.86	1.44	0.77
Total mercury (Hg)	(mg/L)	< 0.001		ND <sup>5</sup>			ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>
Arsenic (As)	(mg/L)	< 0.05		ND <sup>6</sup>			ND <sup>6</sup>	ND <sup>6</sup>	0.0004
BOD	(mg/L)	< 15		0.5			1	0.8	ND <sup>7</sup>
COD	(mg/L)	< 40		9.73			ND <sup>8</sup>	ND <sup>8</sup>	6.49
Total phosphorus	(mg/L)	< 0.2		0.01			ND <sup>9</sup>	0.02	ND <sup>9</sup>
Faecal Coliform	(C/100mL)	150		9			16	16	54

<sup>11</sup> No Project or internationally recognized guideline available therefore the river-specific guideline shall be adopted as the trigger

1 Non-detectable (Detection limit = 0.001 mg/L)

2 Non-detectable (Detection limit = 0.16 mg/L)

3 Non-detectable (Detection limit = 0.010 mg/L)

Parameters which exceed the Project trigger.

4 Non-detectable (Detection limit = 0.005 mg/L)

5 Non-detectable (Detection limit = 0.0002 mg/L)

6 Non-detectable (Detection limit = 0.0003 mg/L)

7 Non-detectable (Detection limit = 2.0 mg/L)

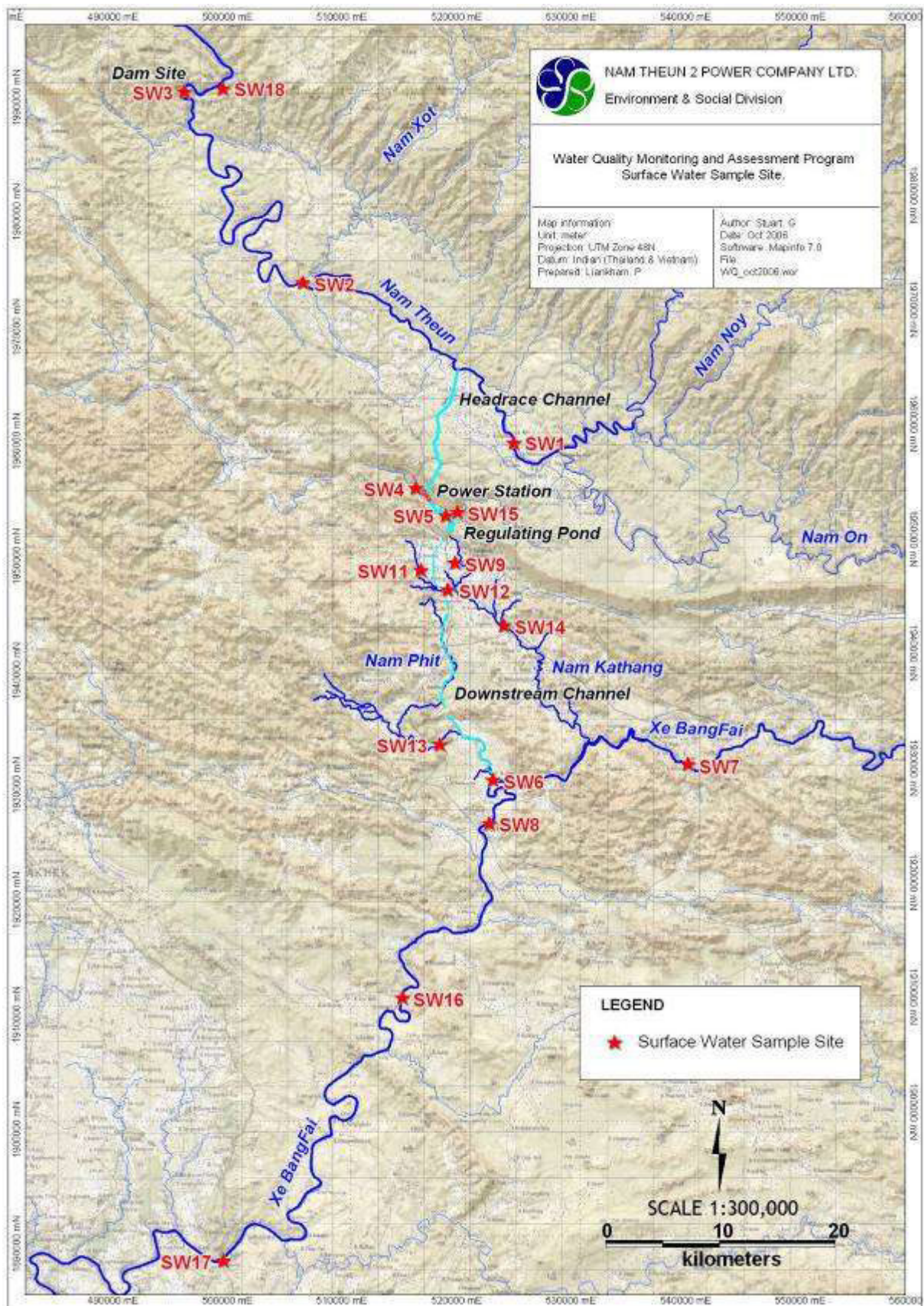
\* 350 µS/cm for Nam Theun; 750 µS/cm for lowlands rivers

\* 40 mg/L for all rivers in all seasons with the exception of 80 mg/L for the Xe Bangfai in wet season

Table: Faecal Coliform results for the Resettlers &amp; Project Lands Groundwater (number of colonies/100ml).

Village	Site ID	Date		
		Apr'06	Oct'06	Nov'06
Oudomsouk	RGW1	0	0	1
	RGW28			0
School	RGW3	0	0	0
Oudomsouk Mai	RGW2	0	0	0
	RGW9		0	0
	RGW27			9
Phone-phan-pek	RGW4	3	5	2
	RGW29			4
Nong Boua	RGW5	0	0	0
	RGW30			0
Boua-Ma	RGW6	0	0	0
	RGW22			0
	RGW23			0
Phonesavang	RGW7	0	6	1
	RGW20			0
	RGW21			3
Sop-On	RGW8	2	0	0
	RGW10		0	0
	RGW18			0
	RGW19			0
Ban Done	RGW11		0	0
	RGW12		0	0
	RGW16			0
	RGW17			0
Sop-Phene	RGW13		0	13
Sop-Hia	RGW14		0	0
	RGW24			2
	RGW25			0
Sop-Ma	RGW15		0	7
	RGW26			12
QA/QC				
Field Blank		0	0	0
Bottle Blank		0	0	0







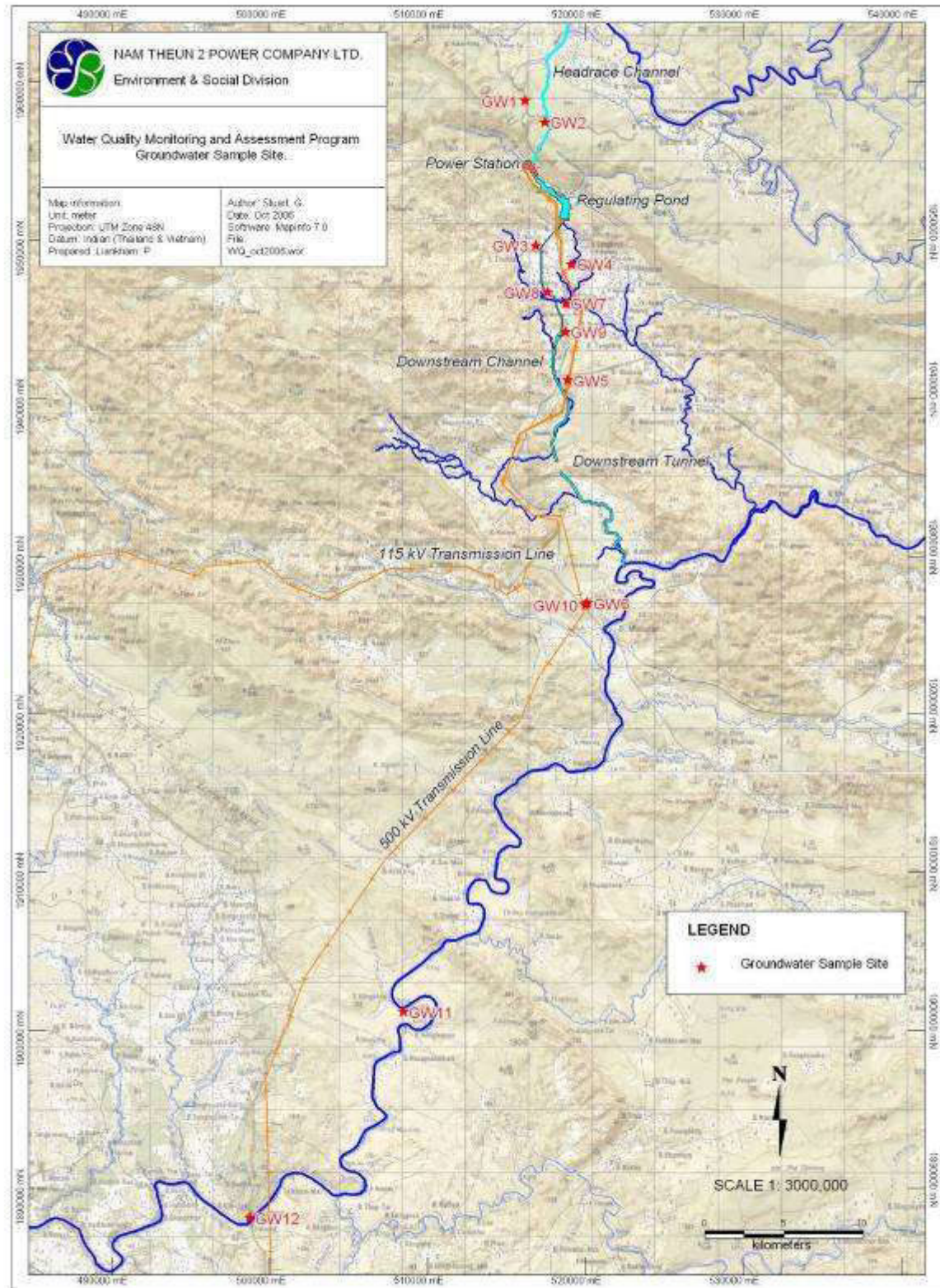
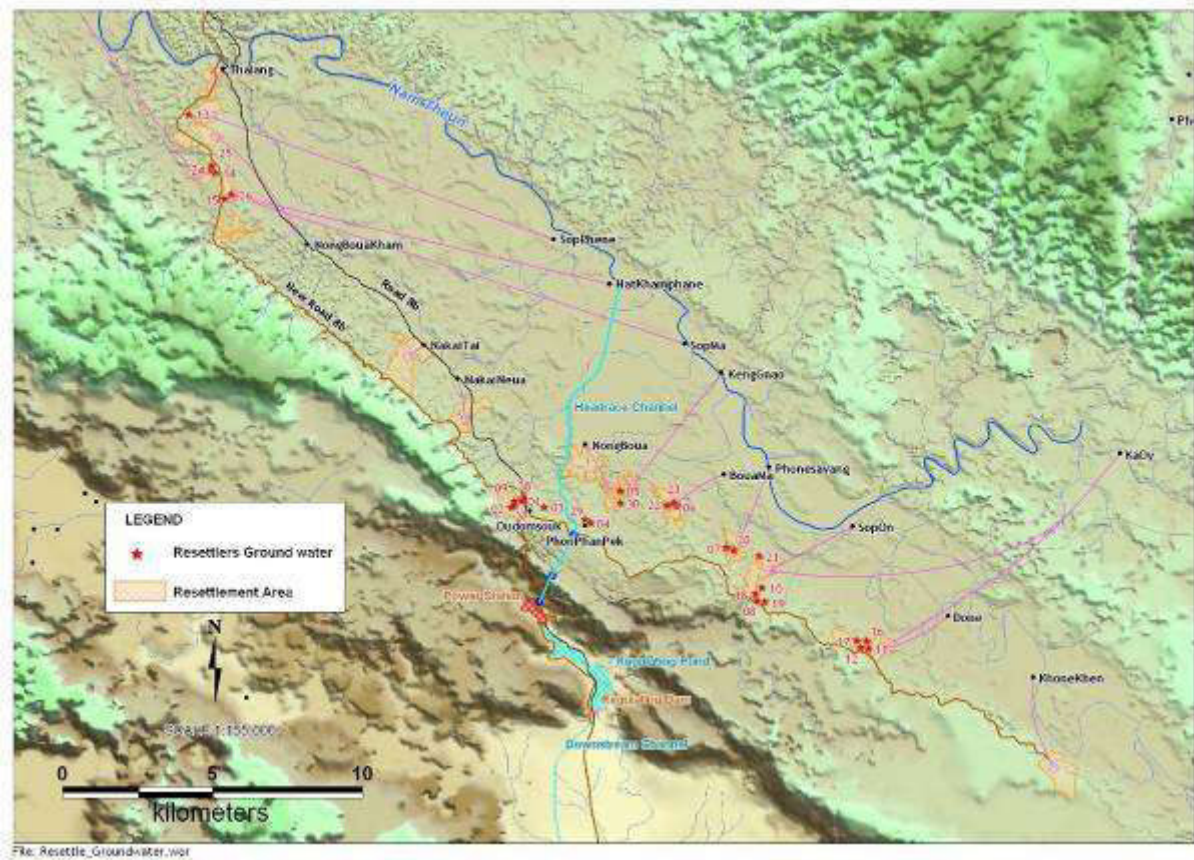


Figure: Faecal Coliform sampling sites for Resettlers & Project Lands Groundwater





### 3.4 Environment Management Unit (EMU) Technical Assistance (TA)

Activities undertaken by the EMU and EMU TA during October 2006 are presented in the Work Plan below<sup>4</sup> and also include:

- Development of the second Quarterly Progress Report (QPR) which will also address NTPC comments on the first QPR. The second QPR was scheduled to be submitted on 20 October 2006 but was provided to NTPC on 12 December 2006.
- EMU personnel continue to accompany EMO Inspectors on joint site inspections, alternating personnel from EMU Khammouane and EMU Bolikhamxay. Details of the construction areas inspected by the EMU are provided in Part B, Section 1.2 (*Environment Protection*) of this Report.

CA Ref No.	EMU Activity (Work Plan)
NA	Translation of the EMU Environmental Monitoring Manual
03	Commence consultation with the SLMU regarding salvage logging operations and measures to maximize biomass removal.
03	Meet with RMU and VFA to discuss roles regarding lesser value biomass removal
07	Consult with the NTPC regarding establishment of adaptive management committee for the Nam Kathang
11	Request information from NTPC regarding the design specifications of the Confluence Area to confirm that appropriate stabilization or protection measures, such as rip-rap, are provided to minimize scouring.
11	Commence infield spot checks of the Confluence Area to confirm consistency of construction activities with design specifications.
13	Conduct infield spot checks of the Downstream Channel construction to confirm provisions for localized low points
18	Consult with WMPA, RMU and district authorities to assess the capacity of the GOL enforcement agencies (technical, human, financial resources) to implement hunting controls in the Resettlement Areas. Assist the GOL enforcement agencies with the development of capacity as required.
19	Consult with the NTPC regarding establishment of adaptive management committee for wildlife program
21	Conduct a GPS survey of the extent of spoil disposal areas in Gnommalat
23	Conduct investigation of vegetation clearance with respect to design standards along new road zones D and F
24	Request the NTPC to provide the results from the PCR field surveys, as well as the recommended mitigation and management measures
25	Request the NTPC to provide a copy of the Health and Safety Program.
26	Request the NTPC to provide a copy of the EIAs for quarry areas.
26	Request the NTPC to report on the progress of quarry activities.
27	Request the NTPC to provide the results of the environmental impact assessment for the final alignment of the Transmission Line
34	Request the NTPC to provide a plan to mitigate noise exceedances as reported in the NTPC Progress Report
36	Review the Landscaping and Revegetation Management Plan (Rev. A)
36	Follow-up request for the NTPC to report on progress of revegetation activities
37	Request the NTPC to report on the implementation of enforcement mechanisms for controlling vehicle speeding
37	Coordinate with GOL to strengthen capacity to enforce speed limits
39	Request the NTPC to report on the implementation of environmental training of construction workforce
41	Request the NTPC to provide copies of the Village Development Plans for resettled villages
41	Clarify roles and responsibilities of the EMU with the RMU with respect to Part A, Part C and Part E
44	Request that NTPC provide a progress report for environmental grievances
44	Assess the feasibility for the EMU to provide capacity building to district staff with respect to grievance management
NA	Review the Salvage Logging Code of Conduct and Technical Guidelines, and the EMP for the Salvage Logging access road to confirm the inclusion of adequate measures to

CA Ref No.	EMU Activity (Work Plan)
	avoid and minimize impacts of pollution
NA	Prepare monitoring report including observations and non-compliances for submission to the Salvage Logging Committee

### 3.5 EMO's activities linked to construction

The environmental activities linked to construction works are part of the Construction Progress Report, Part B of this Monthly Progress Report.

## **Internal, External Monitoring**

## **4 Internal and External Monitoring**

Schedule of visits since Financial Close: No change from previous report.

## **GOL Related Activities**



## **5 GOL related activities**

### **5.1 Watershed Management Protection Authority (WMPA)**

NTPC received the request for annual payment of the WMPA and its associated qualifications (the certification by the Independent Monitoring Agency of its past and future workplans and expenses.) NTPC expects to effect payment to the WMPA in the month of December 2006. WMPA has changed its fiscal year so that now it be from July – June every year.

### **5.2 Optimization of Salvage Logging on the Nakai Plateau**

Salvage Logging Operations have commenced in October 2006 and the transport of logs off the Nakai Plateau commenced in November. The Chairman of the Salvage Logging Committee issued a new Decision regarding the road use of salvage logging truck traffic. Trucks will specifically and only use 2 routes: 1) Ban Thalang to Laksao during the hours of 22:00 – 06:00 while the remaining hours are for NT2 Construction traffic and 2) The new road built to access to Route No. 12 nearby Ban Thongkong. The GoL is preparing progress reports for distribution to the IFI's commencing in December 2006.

### **5.3 Social issues (RMU & DWG)**

See social section.

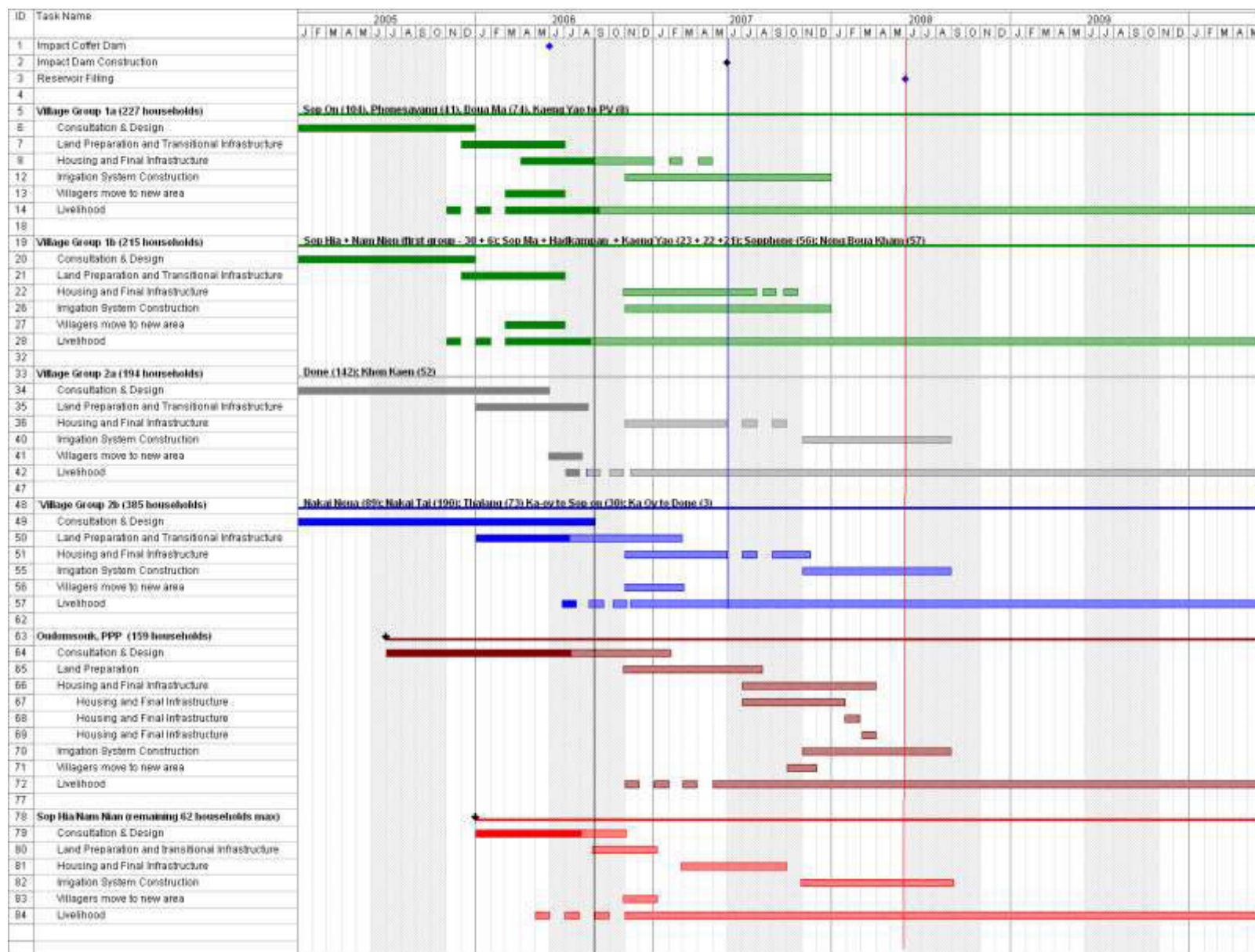
## **Annexes**

## Proposed NT2 Reservoir Nakai Plateau Village Relocation Routes





## Transition Resettlement Schedule





**Nam Theun 2 Power Company Ltd.**

**Nam Theun 2 Hydro-Electric Project**

**Monthly Progress Report  
covering activities in December 2006**

**Part C : Environmental & Social Report**

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## **General Overview**



# 1 General Overview

## ***Project lands:***

- Implementation of the livelihood restoration programs continued. Infrastructure development related to frog, mushroom and pig raising continued.
- Arrangements for distribution of the 22ha of cleared land to PAPs continued to be developed and are expected to be finalized in January 2007.
- Construction of 5 replacement houses in Oudomsouk continued.

## ***Public Health:***

- Construction work in all remaining infrastructure buildings is in progress and expected to be completed in Jan. 2007 (details below).
- Number of training courses were held during the month:
  - Completed three-month emergency medicine training course for Khamkeut in Vientiane.
  - Peer education training on STI was conducted for High School students in Khamkeut District
  - Refresher training courses on "Obstetric register and Maternal and Child Health" for health center, district hospital and district health office staff in four districts
  - Computer training course on "Internet use" for district and provincial health staff
- Conducted World AIDS Day program in five districts and staff of NTPC and partners.
- Distributed 2007 calendar as an educational material to the project villages, districts, provinces, the international agencies related to health working in Laos and all division of NTPC and its partners
- Entering and clean the health checks and survey data of Sop On, Bouama and Phonsavang.
- Prepare the population data of SopMa and Khone Kaen prior to conducting health checks and survey on January 2007 respectively
- Continue and expand monthly Maternal and Child Health clinics in four districts and prepare the family health files at the same time. Currently, 82 clinics were held in 38 villages.
- Six monthly meetings were held in the province and the four districts
- Routine visits to the resettlement villages continued and population health monitored
- Conduct the randomly stool examination of Nongboua villagers as the second survey of worm infestation

## ***Nakai Plateau resettlement***

### ***Infrastructure:***

- Extra topographic survey and mapping: No activity during the month. However the setting out of house and agricultural plots is an ongoing activity by Resettlement Office personnel.
- UXO search and clearance: The contractor has maintained good progress during the month and completed Area 13 agriculture area, 70.5 ha, and is now working in extra areas identified at Areas 1 and 2. From November 2005 to date the contractor and the Khammouane Military have found and destroyed, in the resettlement areas, 1,823 UXO items, including 1,040 bomblets. There is an ongoing contract for UXO community awareness and on-call roving response teams with the same contractor. By the end of November the roving unit have found and disposed of further 1,793 UXO items including 1,616 bomblets. The communications channels between villagers and the response team continue to work very well, with any finds of suspicious items in community areas being quickly reported. In December a large 500 lb. bomb was found and has not yet been destroyed.

- Timber houses: The construction of timber houses in Area 16 (Pilot Village) for 8 families resettling from Ban Keng Gnao is completed. The contractors awarded the timber houses construction contracts at areas 17 Bouama, 18 Phonsavang and 19 Sop On have continued with the construction works and 364 houses are under construction (9 are fully completed). The contractor for the northern villages of Sop Phene has been given notice to start work on 10 January. The remaining contract for the northern villages of Nong Boua Kham have not yet started due to necessary additional preparation works on the site (site clearance, access etc.) and VFA timber supply problems. A bid evaluation report for the VG2 house contracts was completed.
- Roads and tracks: There are now four road construction contracts underway. The three southern VG1 road and track contract is about 95% complete. The Southern Resettlement Road contract is about 80% complete. Three of the four northern resettlement village access roads and tracks are about 83% complete and the additional Area 13 is about 5% complete. The two southern VG2 contract is about 10% complete.
- Irrigation: Progress with the construction of the irrigation area extension at the Pilot Village for the Keng Gnao resettlers is satisfactory. Design of a pilot groundwater irrigation area at Sop On is underway.
- Villages Layout: The preparation of preliminary resettlement village and agricultural layouts for the VG2 villages is continuing by NTPC personnel in consultation with villagers.
- Community Buildings: The bidding procedures for the construction of community buildings has started after a letter of no objection was received from the Bank on 26 December 2006.

Domestic Water Supply and Sanitation: The boreholes drilling program has continued as per schedule and a total of 6 new productive wells were completed in the village of Ban Sop Phene (area 11). In the same village, 3 boreholes were abandoned due to insufficient yield.

To date, 127 deep productive boreholes have been successfully drilled and developed on a total of 142 tentatives. All included, the total failure rate is of about 10.5%. However still sixty six (66) wells only are equipped with water lifting devices, due to further delay in the hand pumps procurement.

- Electricity: The design of the resettlement village electrification systems is underway and complete for five villages

#### Livelihood Plans:

##### Forestry:

- 1,700 cum logged in December.

##### Agriculture / Livestock:

- Re- organization of the A/L team defined and agreed. Recruitment on-going (job description and TORs written and advertised in December). The A/L team moved in a new larger and more suitable office.
- Training session carried out on 12<sup>th</sup> December about the method to prepare the fields. 65 NTPC staff and DAFO (including 18 people from CD team) attended the session. This training was based on some specific plot in Bouama (method to prepare the land), and in Nong Boua (culture of vegetable with DMC technique).
- Definition of the technical program for the whole year 2008.
- Definition of the budget for the period 2008/2014, with the template and basis created in June 2006 by the livelihood coordinator and the livelihood advisor

##### Fisheries:

- No changes from previous report.

##### Community Development:

- Sop Hia /Nan Nian resettlement area choice seems to be final with some households going to Khamkeut, some coming to Area 7 (Nakai) and around 17 households wishing to go to new area (Poung Phai).
- Nakai Tai and Nakai Neua village layout has been completed. Even though they decided to be merged as one single village, the village layouts are still kept separate (about 4 to 6 Km far from each other).
- During the whole dry season, the remaining old materials and belongings of the resettlers will be transported to new sites to avoid flood impacted by the main dam construction, which is due to be completed by end this dry season.
- Ka Oy villagers are now moving to new Sop On and Ban Don by end of February 2007.
- Grievance filing system is being upgraded for village Team to be more effective and have good incentives to work. Training on cases management has been conducted to the Grievance Team members.
- Warm clothes were distributed to Sop Phene villagers.

***Downstream Program:***

- Work continued to develop livelihood restoration activities, including development of village organizations, village revolving and savings funds, and demonstration farms within the selected pilot villages.
- Work continued to finalize employment contracts for additional staff, as noted in previous monthly progress reports. Most new staff members will commence work during January 2007.

***Environment:***

- Water Quality sampling (5-10 December 2006) and analysis.
- Ongoing Interim Human Elephant Conflict (HEC) Monitoring and continued contractual activities for Elephant Program Phase II.
- Review and revision of the Inception Report for the Wildlife Management and Monitoring Program.
- Ongoing contractual activities for the environmental education component of the Transitional Strategy.
- Review of, the 2<sup>nd</sup> Quarterly Progress Report from the EMU.

***Monitoring:***

- LTA mission from 11 to 15 December 2006

## 1.1 Staffing NTPC, GOL (EMU, RMU, DWG) and Partners

### ○ NTPC E&SD Staffing

#### Legend:

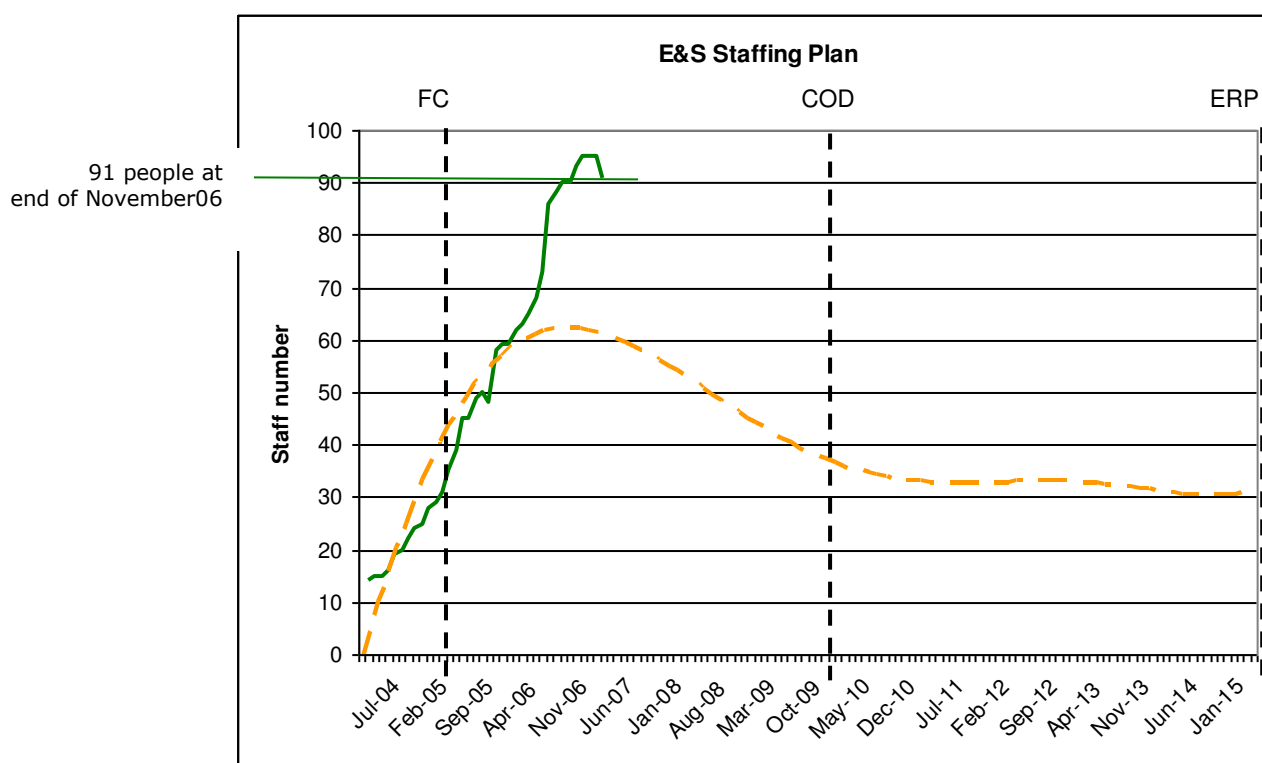
Scheduled staffing plan

Actual staff recruitment

FC = Financial Close

COD = Commercial Operation Date

ERP = End of Resettlement Period



In addition to NTPC staff, individual consultants are working full/part time with NTPC teams

One expatriate and three local staffs retired during of this month.

The construction of the Nakai Residential Complex in Oudomsouk for use by the NTPC E&S team is on-going (complex of 54 rooms/studios/apartments and 6 villas).

### ○ EMU Staffing

No change from previous report.

### ○ RMU and DWG Staffing

No change from previous report.

### ○ Partners

No change from previous report.

## 1.2 Unanticipated Project Impacts

No change from previous report.

## 1.3 Additional Plans and PIP updating

- PIP / AIP

No change from previous report.

- Additional Plans

No change from previous report.

## 1.4 Grievance procedure

No new claims were received during the month of December on the Nakai Plateau. However, work was done to follow up on claims received prior to December.

The nine claims were received in Gnommalat District last month were reviewed. Three claims have already been resolved, with others pending further investigation. Eight new claims were received in Gnommalat District during November.

## 1.5 Communication

No change from previous report.

## 1.6 Procurement

In December, procurement activities have been mainly, but not only focusing on:

- Evaluation process of the proposals received for the construction of timber houses (VG2 and Project Lands) and submission of the evaluation report to the WB for prior review,
- Evaluation and combination of the technical and financial proposals for the Independent Monitoring Agency (Plateau) and invitation for final negotiation of the awarded Firm (process handled by the GOL evaluation committee),
- Evaluation, award and start works for the construction of kilns building,
- Finalize search for suppliers for agriculture program requirements and preparation of bidding documents,
- Negotiation and award of contracts for consultants for the Downstream program,
- Re-design of bidding requirements for the supply, installation and commissioning of IT & TV cable networks at the Nakai Residential Complex (re-bidding necessary because of paucity of bidders),
- Bidding process for the Community Buildings,
- Preparation of the bidding documents for concrete lined shallow wells,
- Preparation of the bidding documents for the supply and installation of submersible pumps and pipe system to the water tank for health infrastructures,
- Preparation of the bidding documents for the supply of 4WD pick up for the Downstream Team,
- Update of the NTSEP Procurement Plan and Master List for Tax Exemption for the calendar year 2007.

## **Social Activities**

**Physical Cultural Resources, Project Lands,  
Camp Followers**

## 2 Social Activities

### 2.1 Physical Cultural Resources, Project Lands, Camp Followers

#### 2.1.1 Physical and Cultural Surveys & Salvage

Based on the findings of the baseline PCR survey and the impact assessment advice provided by the HC, PCR were separated into four PCR plans: (i) movable PCR; (ii) PCR within construction areas; (iii) PCR within the Reservoir; and (iv) PCR along the Xe Bangfai.

##### **Movable PCR Plan**

To date, the Institute of Cultural Research (IoCR) has implemented this plan which consisted of a series of consultations and management measures. Management measures included (i) securing PCR (Buddha images) in situ; (ii) relocating PCR to the security of the temple; and (iii) improving security and awareness at the temples to help prevent theft.

No special remarks for this reporting period.

##### **PCR within Construction Areas Plan**

To date, the Department of Museums and Archaeology (DMA)/IoCR has implemented this plan which consisted of a series of consultations and management measures. Management measures included (i) appeasement ceremonies; (ii) relocation of PCR (cemeteries and stupas); and (iii) redesign of the Project to avoid impacts from construction.

Activities during December 2006 include:

On 8-10 December 2006, IoCR conducted appeasement and relocation ceremonies, and constructed a new spirit hut for the territorial spirit (Phi Meuang) of Ban Oudomsouk. The focal point for the territorial spirit was a spirit hut located behind Ban Oudomsouk temple. The appeasement ceremony, relocation and construction of a new spirit hut were in response to community concerns that construction activities for the Saddle Dam 12B drainage channel were impacting the territorial spirit.

##### **PCR within the Reservoir Plan**

To date, IoCR has completed consultation for all resettlement villages and completed management measures for almost all VG1 PCR sites. Activities included (i) appeasement of spirit sites (ii) identification of new cemetery sites and UXO clearance prior to use; (iii) an appeasement ceremony for old cemetery sites; and (iv) ceremonies for the old temple sites prior to relocation of Buddha images.

Activities during December 2006 include:

- A contract has been finalized for IoCR to implement management measures for the remaining VG2 PCR sites. Villages still requiring management measures include (i) Thalang; (ii) Nakai Tai; (iii) Nakai Neua; and (iv) Ka Oy. Activities will be implemented by IoCR and are scheduled to commence in January 2007 and continue until March 2007. Activities will include (i) appeasement ceremonies for spirit sites; (ii) relocation ceremonies for temple sites; (iii) appeasement ceremonies for cemetery sites; and (iv) identification of new cemetery sites and UXO clearing.

##### **PCR along the Xe Bangfai Plan**

The plan for PCR along the Xe Bangfai will be implemented in coordination with the Downstream Program. One historic site, five spirit sites and twelve temples are located on the banks. The temple sites were surveyed to prioritize monitoring effort and to identify any requirement for pre-operations management measures (relocation of infrastructure or bank protection).

Activities during December 2006 include:

- DMA has submitted a draft report which documents the archaeological salvage activities for the historic kiln site which is located on the banks of the Xe Bangfai. Activities included (i) consultation with Ban Mahaxai and Pova Neua; (ii) ceremony prior to archaeological salvage activities; (iii) survey and mapping of the banks to assess the number and distribution of the kilns; and (iv) conduct a detailed archaeological investigation of three of the best specimen kilns. The report is under NTPC review.

### **Chance Find PCR**

In addition to baseline PCR, there is potential for additional PCR (chance find PCR) to be identified during construction. DMA and IoCR are providing ongoing technical assistance to NTPC to deal with these chance find PCR as and when they are discovered.

No special remarks for this reporting period.

### **PCR Monitoring**

On 21 December 2006, the monthly PCR monitoring was undertaken by the EMO. The following table presents the villages and their PCR included in the PCR monitoring.

Village	PCR ID	PCR Type	Issue
Phonsa-at	PCR/IN/7/1	Cemetery	No issue
Pakkatan	PCR/IN/7/2	Cemetery	No issue
	PCR/IN/7/3	Cemetery	No issue
Phonsy	PCR/IN/7/4	Spirit Site	No issue



*Pre-relocation appeasement ceremony for the territorial spirit site in Ban Oudomsouk (top left), relocation activities (top right), construction of new spirit site (bottom left) and a ceremony at the new spirit site (bottom right)*



## 2.1.2 Project Lands

### Main events in December:

- Implementation of the livelihood restoration programs continued. Infrastructure development related to frog, mushroom and pig raising continued.
- Arrangements for distribution of the 22ha of cleared land to PAPs continued to be developed and are expected to be finalized in January 2007.
- Construction of 5 replacement houses in Oudomsouk continued.

#### ○ Baseline Studies

The collection of baseline study data is complete.

#### ○ Meetings & Consultations

Coordination meetings with the DCWG and RMU continued during the month of December 2006.

#### ○ Compensation

A summary of compensation payments for the month of December is included in the following tables:

#### Final Compensation – Gnommalat District

No	LPA	Name of Village	PAPs	Amount
1		Kobong		
2		Koutphadang		
3	38a	Keovilay	1	75,789,000
4		Laonangam		
5	38a	Nongseng	6	158,961,000
6	38a+b	Phonlathkoui	2	9,765,000
7	38a+b	Gnommalathtay	9	230,988,500
8	38a	Somsanouk	2	5,808,000
9	38b	Donepieae	1	707,000
10	38b	Thampoung	6	198,238,500
11		Phathung		
		Total	27	680,257,000

#### Final Compensation – Nakai District

No	LPA	Name of Village	PAPs	Amount
1	18	Oudomsouk	16	31,419,000
2	18	Oudomsouk		
3	20a	Phonphanperk	1	7,950,000
4	18	Oudomsouk		12,089,000
		Total	17	51,458,000

**Interim Compensation – Gnommalat District**

No	LPA	Name of Village	PAPs	Amount	Date of Payment
1	30,33,34,35	Kobong	15	32,176,000	29/9/2006
2	33,36	Koutphadang	6	9,408,000	29/9/2006
3	33,34,35	Wathath	4	9,865,000	29/9/2006
4	33,34,35,36	Keovilay	62	172,346,000	23-25/9/2006
5	33,34,35,36	Laonangam	83	90,729,000	28/9/2006
6	33,34,35	Nongseng	48	93,141,000	26/9/2006
7	34,35	Phonlathkoui	11	8,060,000	29/6/2006
8	40	Thampoung	6	4,710,000	1/10/2006
9	42	Phathung	5	7,786,000	30/9/2006
10	51	Gnommalath	6	900,000	21/12/2006
Total			246	429,121,000	Kip

**Interim Compensation – Khamkeut District**

No	LPA	Name of Village	PAPs	Amount	Date of Payment
1	01a	Namthy			
2	06b	Phonsaath			
3	01a	Namthy	9	13,683,000	30/11/2006
4	06b	Phonsaath	5	5,613,000	30/11/2006
Total					Kip

**Oudomsouk Urban Planning Resettlement Action Plan:**

The contractor continued work on the construction of the 5 replacement houses in Oudomsouk.

**Livelihood restoration**

Livelihood restoration programs continued during December for PAPs whose livelihood is more than 10% affected by project activities. Contracts for implementation of the various programs have been completed and are currently being implemented. Developments to specific components of the livelihood restoration program during the month of December are described below.

Rice Improvement: Preparations for the 2007 wet season rice program are now under way.

Fish cultivation: Aquaculture activities continued, mainly feeding. Use of irrigation water continued for some ponds.

Non-Timber Forest Products Information was collected from PAPs in 6 villages: Laonangam, That Kobong, Phonlatkhoutay, Thongmang, Thathod and Nongseng regarding NTFP collection and use. The survey identified NTFPs as an important source of income and source of food. However, NTFPs are being over harvested, largely due to increasing population. Information was collected regarding market values for many commercial species of NTFPs, as well as identification of NTFPs which PAPs are interested in growing. Additionally, during the month of December a demonstration plot of medicinal plants was transplanted under supervision of staff from Traditional Medicine Research Center.

Orchid cultivation: Implementation of the contract with the University of Laos for orchid development in Nakai and Gnommalat districts continued during the month of December, with initial activities being concentrated in Nakai District. The project aims to preserve the numerous existing species of orchids available in the Nam Theun 2 project area, as well as to assist interested farmers in understanding the possibilities for commercialization of orchid cultivation. Sample collection has been completed for Nakai.

Vocational training: No activity during the month of December.

Forage and Livestock: Forage plot activities continue, mainly watering and fertilizing. Preparation to expand forage activities to dry season rice fields commenced.

Frog & pig raising, mushroom cultivation: Activities in association with the Non-Formal Education Development Centre of Laos continued for Mushroom house, pig pen and frog tank construction has proceeded following UXO clearance. A total of five frog tanks, nine pig pens, and six mushroom huts have been completed to date. Delivery of additional piglets and frogs is expected during January.

Horticulture: Preparation for the horticulture portion of the livelihood restoration program continued in Nakai, Gnommalat and Mahaxai districts. Activities include soil preparation, installation of electrical services, and procuring materials.

Replacement land: Preparation of the 22ha discussed in previous reports continued.

- Handover of lands to Head Contractor
- Other

*Replacement House Construction Gnommalat*

Bids were received for construction of 20 houses and one bathroom in Gnommalat. It is expected that the contract will be signed in early January 2007.

*Relocation of structures within the transmission line corridor*

Arrangements were finalized regarding relocation of houses and other structures within sections 4 & 5 of the 500kV transmission line corridor.

## Project Lands Photographs for the month of December 2006



Forage



Forage plot



Pig raising



Compensation payments



UXO clearance activity



Lao Development Bank representatives



Medicinal Plants in a nursery



Transplantation of medicinal plants

### Camp Followers

- Population Management: Monitoring of labor and population movement:

This activity is placed under direct control of RMU since January 2006.

- Human Trafficking Control

This activity is placed under direct control of RMU since January 2006.

- Infrastructure Development

No changes from previous report.

- Public Health

#### STIs and its control:

No changes from previous report.

- Traffic Safety and Regulations

Development of regulations / Review and strengthening of regulations: No changes from previous report.

Road Safety: No changes from previous report.

- Social Security and capacity building for local agencies

Support and technical assistance for District Police Offices:

Establish inter-sectoral Task Force on Population management and security: No changes from previous report

# **Social Activities**

## **Health Programs**

## 2.2 Public Health Regional and Resettlement Programs

Following major activities were undertaken during December 2006:

- Construction work in all remaining infrastructure buildings is in progress and expected to be completed in Jan. 2007 (details below).
- Number of training courses were held during the month:
  - Completed three-month emergency medicine training course for Khamkeut in Vientiane.
  - Peer education training on STI was conducted for High School students in Khamkeut District
  - Refresher training courses on “Obstetric register and Maternal and Child Health” for health center, district hospital and district health office staff in four districts
  - Computer training course on “Internet use” for district and provincial health staff
- Conducted World AIDS Day program in five districts and staff of NTPC and partners.
- Distributed 2007 calendar as an educational material to the project villages, districts, provinces, the international agencies related to health working in Laos and all division of NTPC and its partners
- Entering and clean the health checks and survey data of Sop On, Bouama and Phonsavang.
- Prepare the population data of SopMa and Khone Kaen prior to conducting health checks and survey on 15-17 and 18-20 January 2007 respectively
- Continue and expand monthly Maternal and Child Health clinics in four districts and prepare the family health files at the same time. Currently, 82 clinics were held in 38 villages.
- Six monthly meetings were held in the province and the four districts
- Routine visits to the resettlement villages continued and population health monitored
- Conduct the randomly stool examination of Nongboua villagers as the second survey of worm infestation

Abbreviations used in this section:

DCD	District Community Development
DH	District Hospital
DHO	District Health Office
HC	Health Center
HPMD	Health Properties Management Division
HPMU	Health Program Management Unit
ICHC	Integrated Community Health Center
IFMT	Institut Francophone pour la Medecine Tropicale
IP	Institut Pasteur
MCH	Maternal and Child Health
MOH	Ministry of Health
NCCAB	National Committee for Control of AIDS Bureau
ORPP	Outbreak Response Preparedness Plan
PH	Provincial Hospital
PHO	Provincial Health Office
TMRC	Traditional Medicine Research Center
UNPFA	United Nations Population Fund
VHC	Village Health Committee
VHV	Village Health Volunteers
WHO	World Health Organization

<b>Public Health Infrastructure &amp; Equipment, vehicles</b>			
<b>Buildings</b>	Progress during the month	Progress to date	
Consultancy services for preparation of bidding document		100%	Delayed consultancy with Ministry of Health leading to delayed start infrastructure programs
Khammouane Provincial Hospital		100%	Only refurbishment of emergency ward. The balance according to hospital needs is transferred to medical equipment and ambulance
District Hospital	40%	90%	Refurbishment works in Nakai, Mahaxai and Khamkeut hospitals completed in July 2006. Second half of renovation works of the roof for the Khamkeut District Hospital completed in Dec. 2006. GMLT District Hospital new construction is in progress and expected to be completed in Jan. 2007.
Health Center	50%	95%	Refurbishment work for Nadou and Kengdaeng Health Centers completed in July 2006. Construction for Khetphid and Nasok HCs are in progress and expected to be completed in Jan. 2007. Contract for Nongbouakham Integrated Community Health Center (IHC) - in Resettlement Health Program - new construction has been delayed. (Note: Two additional IHCs belonging to health program are under Infrastructure budget)
Infrastructure maintenance			Most of the infrastructure maintenance will be required after 2008 onwards.



Medical & Other Equipment	Monthly Progress	Progress to date	
<b>Medical and Lab Equipment</b>			
Consultancy for preparation of bidding document		100%	Delayed consultancy with Ministry of Health leading to delayed procurement program
Medical Equipment (KMN Provincial Hospital, 4 District Hospitals and 6 Health Centers)	85%	95%	<p>Lot II items have been distributed to 4 district hospitals (DHs)</p> <p>Lot I, III and IV arrived and distributed to all health facilities. X-Ray machine will arrive in January 2007 in line with the completion of GMLT DH</p> <p>In addition, some biochemistry and laboratory equipment is on order as well. Further supply of medical equipment will be assessed according to need after completion of the construction work.</p> <p>The need for new hematology unit at provincial hospital was identified and procurement order placed.</p>
Ambulance Equipment and other sur-charges		90%	All ambulances have been installed with the emergency equipment.
STIs Program	4%	23%	Develop STI services at provincial and district levels, including introductory workshops and drug revolving funds for STI Program. (This item originally was budgeted under medical equipment hence in this section)
<b>Non-Medical Equipment</b>			
Photocopier	0%	100%	One for each DHO and the Khammouane PHO
Computers & printers			Two sets to each district health office and two sets to Khammouane Provincial Health Office. One printer for PHO in September 2006 Internet cards for e-mail and internet services were provided to all four districts and the province
Audio-visual equipment (television and DVD player)			One set of television and DVD player to district health offices and health centers for health education program. Additional BCC equipment will be provided in 2006-07
Fridge, water cooler, LCD projector, fax and other items			One set to each district health office and district hospital and a fridge to Khammouane Provincial Health Office. Two fax machines for Nakai and Mahaxai DHOs in September 2006
Hospital beds (Khamkeut)			30 steel beds with mattresses to Khamkeut District Hospital
Hospital furniture (KMN Provincial Hospital, 4 District Hospitals and 6 HCs)			Health facility furniture preparation for procurement in progress.
Bed Nets, including impregnation	0%	30%	<p>2,875 nets for 21 villages of Mahaxai, 3,011 nets for 35 villages of Gnommalat, 3,234 nets for 15 villages of Nakai and 2,364 nets for 15 villages of Khamkeut. Nets will be supplied regularly during the life of the project. Vector control measures/equipment will be provided according to need.</p> <p>Total: 11,500 bednets and 22,710 tablets of Supatab</p>
Other package non-medical equipment			Other package of non-medical equipment will be provided according to the need after completion of refurbishment and new construction work
Road safety communication			This money will be spent in conjunction with overall road safety program in NTPC project areas.
<b>Vehicles</b>			
Motorbikes	0%	70%	<p>12 motorbikes (6 from project and 6 donated by NTPC) distributed to DHOs and HCs. Plans of replacement mid project.</p> <p>Remaining 30% of funds are for replacement of bikes during the life of the project.</p>
4WD Pickups	0%	80%	Four 4WD pickups procured and distributed one each to Nakai, Mahaxai, Gnommalat Districts and one to Khammouane Provincial Health Office. Vehicle use policy has been developed in conjunction with the GOL for exclusive use of health work.
Ambulances	25%	-19%	All four ambulances have been handed over.



Public Health Program - including awareness programmes			
Supplies - Drugs, kits, forms and manuals.	Monthly Progress	Progress to date	
<b>Drug and Medical Supply</b>			
KMN Provincial Hospital		38%	Drug revolving fund for emergency is ongoing and is supervised regularly.
District Hospital		83%	Drug revolving fund for four districts is ongoing and is supervised regularly
Health Center		79%	Drug revolving fund for four health centers is ongoing and is supervised regularly
Community level (Village Drug Revolving Fund)		41%	Drug revolving fund for 68 villages is ongoing and is supervised regularly.
Community level (TBA kits)		67%	Traditional Birth Attendant kits to 96 trained TBAs is ongoing and is supervised regularly
<b>Office and Vehicle Operating cost</b>			Operating costs have been transferred to 4 DHs/DHOs and KMN PH/PHO 2 time per year, including health centers.
KMN PH/PHO			Progress in percentage will be more realistically calculated at quarterly intervals
DHs/DHOs			Progress in percentage will be more realistically calculated at quarterly intervals
HCS			Progress in percentage will be more realistically calculated at quarterly intervals
<b>Others (training materials, printing forms, etc. ...)</b>			Including BCC materials Obstetric registers in print 2007 calendar as health education materials – was distributed to villagers, HCs, DHs/DHOs, PHs/PHOs, NTPC and International Agencies related to health working in Laos. Health checks and survey forms
Health Education and Awareness Program	Progress during the month	Progress to date	
STIs including HIV/AIDS	5%		Apart from regular health education program in health facilities, special health education and awareness activities are organized on special events such as World AIDS Day and boat racing festival.
			Substantial numbers of people from the community attend these public events - 43 public event sessions were held in four districts and in Thakhek until October 2006.
			Preparation for World AIDS Day for NTPC and related staff is in progress
			PCCA is organizing secondary school awareness program in Thakhek for the forthcoming World AIDS Day (WAD). They will also organize awareness and education program on STIs for service women in Thakhek.
			DCCAs are organizing special WAD programs in their respective districts.
			Introductory Workshop; Orientation Workshop; Preliminary interview and medical checks up of service women and setting up STI services in four districts
			Peer education training program – youth group in GMLT District on 7-10/11/06 and STI treatment for private pharmacies in Mahaxai on 2-3/11/06. Peer education training program – High School student plans for the end of 2006.
Operating cost for PCCA/DCCA	0%		Conducted World AIDS Day program in five districts and staff of NTPC and partners. <b>To date: 116 sessions and 27,417 participants</b>
			PCCA and DCCAs are responsible for carrying out education and awareness activities in the area of STIs including HIV/AIDS. Their capacity is limited but slowly improving. It is important to support them in this program for sustainability.
Relocation/medicinal plants			Initial work was carried out. Further studies will be carried out in conjunction with National Traditional Medicinal Research Center after resettle population move into their

Public Health Program - including awareness programmes			
			<p>permanent housing.</p> <p>Traditional Medical Research team visited GMLT and Nakai Districts for experimentally growing Artemisinin annua and identifying other medicinal plants for livelihood purposes. Project jointly conducted under the supervision of Agriculture, VFA and Project lands and coordinated by HPMU.</p> <p>Preparation for training of traditional healers is in progress with Traditional Medical Research team, postpone from Dec. 2006 to early 2007</p>
Consultancy fees (Road safety, PHC, psychosocial, etc.)			This money will be spent in conjunction with overall road safety program in NTPC project areas.

Strengthening Human Resource in Public Health			
Supervision and Monitoring	Monthly Progress	Progress to date	
Incentive			<p>Incentive were distributed two times to provincial, district and health center in all project target areas, while only one time were provided to village health workers since they were trained in the past few months. Discussions are being held to find ways to link these incentives in future to performance. The third incentive program - T-shirts arrived and are to be distributed in Jan. 2007. Briefcases expected to arrive Jan. 2007.</p>
Field visits for supervision and support			<p>Resettlement Health Program - bi-weekly visits to all resettlement sites for review of environmental and health situations, including emergency care for any patients.</p> <p>Regional Health Program - through integrated outreach program consisting of health center, district health and HPMU staff visiting health centers and villages.</p>
Integrated Outreach Program			<p>Integrated outreach work consist of more comprehensive health education and awareness on a number of health topics such as maternal and child health, STIs including HIV/AIDS, malaria, diarrhea, respiratory infections, hygiene and sanitation, road safety</p> <p>To date: 350 sessions and 19,317 participants</p>
Strengthening Health Service Delivery	15%		<p>Regular review of service delivery to district hospitals and health centers by district health staff.</p> <p>Emergency medical care/referral system training program organized through Provincial Hospital for the four District Hospital staff</p> <p>Emergency obstetric care referral system is also developed and will be reviewed quarterly</p> <p>Supervision was carried out in all health facilities including Provincial Hospital for EOC and new obstetric register use</p> <p>Maternal and Child Health service is being organized at monthly intervals for resettled populations. This will be followed by all health centers in their respective villages.</p> <p>HPMU staff provided variable levels of supervision and training to health center staff in different locations in conducting monthly Maternal and Child Health clinics in 38 villages (cumulative number of monthly MCH clinics held = 82)</p>

Training	Progress during the month	Progress to date	
Community level	5%		<p>Seven TBA training sessions (96 participants), seven VHV training sessions (101 participants) and seven VHC training sessions (66 participants). Periodical training and refresher program will continue throughout the life of the project.</p> <p><a href="#">Soya milk production training</a>  <a href="#">STIs training program for private pharmacies</a>  <b>To date: 24 sessions and 352 participants</b></p>
Health Center, District and Provincial levels	%		<p>Five training sessions including three TOT (MCH, STI, TBA and peer educator) (102 participants)</p> <p>Training sessions for all level of health workers will be repeated at periodical intervals depending on the subject matter.</p> <p>Laboratory services training is planned for June-July 2006</p> <p>STI Program - Peer educator training in 4 districts</p> <p>Emergency medical care/referral system training program organized through Provincial Hospital for the four District Hospital staff.</p> <p><b>To date: Ten sessions and 158 participants</b></p>
Long Term	%		<p>Two long term training session, namely emergency medicine and ICHC of three months (9 participants) and one month (two participants) respectively. Another 3-month course for Khamkeut District .....</p> <p>Long term training for X-Ray and Ultrasound in Vientiane for Gnommalat and Khamkeut District Hospitals during July to September 2006 is completed.</p> <p>One-month training on Maternal and Child Health in Vientiane for Kengdaeng Health Center staff will be completed on 5<sup>th</sup> October 2006.</p> <p>Emergency medicine training continue for Khamkeut in Vientiane – completion December 2006</p> <p><b>To date: Six sessions and 17 participants</b></p>
Study Tours		90%	<p>All district hospital and health center staff were taken for study tours to Integrated Community Health Center (ICHC) in Vangvieng and Taleo (59 participants)</p> <p><b>To date: Three trips and 59 participants</b></p>
Workshop on how to identify psychosocial/drug abuse problems			<p>It requires different methodology to assess the situation. The focus group discussions in future will reflect on this social problem if it exists in the communities</p>
On the job training			<p>This activity is incorporated with on the job training during supervision and support.</p> <p>TOT course on peer education in Thalad</p> <p>STI training program – treatment and lab for KK, GMLT and MHX DH staff</p> <p>Biochemistry training for Khamkeut and Khammouane PH</p> <p><a href="#">Refresher training courses on “Obstetric register and Maternal and Child Health” for HC, DH and DHO staff in four districts.</a></p> <p><b>To date: 11 sessions and 75 participants</b></p>

Meetings	Progress during the month	Progress to date	Monthly meetings are held in each district and Khammouane Provincial Health Office. These meetings provide an opportunity for educational updates on conceptual and methodological aspect of health service delivery along with the achievements and future plan
Create Outbreak Detection and Response Preparedness Unit		100%	Implementation of the National Avian Influenza awareness program in conjunction with the provinces (Khammouane, Bolikhamxay and Savannakhet) To date: Two meetings and 35 participants
Meetings at provincial and district levels			Regular meetings at provincial and district levels To date: 81 meetings and 1,317 participants
Quarterly meeting at HC (VHVs, HCs)	20%		The first quarterly meeting at HC was held in four districts: Khamkeut (1), Nakai (2) and MHX (2)
			To date: Five meetings and 137 participants.
Health education materials and activities - design and production	10%		Support under health education program for all health facilities in the project areas. Number of IEC materials have been developed/ copied and distributed to district, health center and villages like posters, VCDs and DVDs. 2007 calendar as an educational material was distributed to the project villages, districts, provinces, the international agencies related to health working in Laos and all division of NTPC and its partners
Develop the procedures for the referral system			Referral system methodology being followed up
Zonal Health Committee Meeting (4 x per year for each ICHC; and for DH)			Same as quarterly meeting
Adapt ICHC accounting and management system			New system will not be introduced. Instead, GOL system similar to other areas in the province will be implemented

Public Health Monitoring and Surveillance	Progress during the month	Progress to date	
Task force meeting			To be redefined as the present definition is difficult to define.
Routine data collection/HIS			Routine data collection and collation. (Note: considerable backlog to be completed)
Outbreak Response Preparedness		100%	Report published and distributed in English. Lao version with the Ministry of Health for adoption and translation
Outbreak Response Operational		10%	Translation of English report and distribution, followed by training workshops.
Scientific support			Scientific support and areas of support are being redefined. Possibility of getting assistance from additional sources.
Existing data analysis 2004		100%	Completed
Midterm survey	0%		Will be carried out in 2008-09, with planning starting in mid-2008
Special surveys	15%	25%	Health checks and survey in Nongboua and Sop On Villages completed.  Health checks and survey conducted in Bouama and Phonsavang Villages on 13-18 November 2006.  Data for Sop On, Bouama and Phonsavang is being clean and analyzed.
Monthly MCH clinics		20%	Monthly MCH clinic for Nongboua and Sop On villages are regularized now.  The monthly MCH clinics will be extended to the regional health program. Health center staffs are being trained to conduct this activity at monthly interval in all villages.  HPMU staff provided variable levels of supervision and training to health center staff in different locations in conducting monthly Maternal and Child Health clinics Currently, 82 clinics were held in 38 villages.

Equity Fund	Progress during the month	Progress to date	
5% of total budget			With the fast track resettlement program in operation, there has been an increasing need for emergency provision for individuals. To date 15 individuals have been referred and paid for treatment in Provincial hospital Thakhek.

# **Social Activities**

## **Nakai Plateau Resettlement**

## 2.3 Nakai Plateau Resettlement

### 2.3.1 General

November was another month of consolidation of the villages in transition – the eight villages that were established prior to and during the previous wet season. With the wet season now past, access roads which previously had been flooded and/or damaged were quickly repaired to enable construction and commerce to resume.

Excellent progress was made in both the northern and southern resettlement area access roads as well as the Southern Resettlement Road to Area 22, on the southernmost tip of the plateau. One immediate result of improved access can be seen in the numbers of traders traveling to and from the villages to engage in commercial activities, as well as the numbers of villagers traveling to and from Oudomsouk – for example students traveling in to high school.

The major technical issue facing the physical transition villages at present remains the quantity of sawn timber provided to building contractors to enable the completion of permanent houses. The shortfall of timber available from the resettlement areas, documented elsewhere, is being addressed through management/GOL consultations.

Rice and protein distribution programmes as described in previous reports is continuing, as are bi-weekly health checks. Consultations with transition villagers will be commenced in January 2007 in order to jointly agree on an appropriate plan for ramping down of transition support as villagers settle in and livelihood opportunities are provided.

The challenge remains in keeping the transition resettlers busy during the current phase of resettlement by continuing to provide a variety of livelihood opportunities and other activities that facilitate the development of a sense of ownership of the new villages among the Resettlers. These activities include the building of fences, establishment of home gardens, mushroom houses, animal pens, flowers and shrubs etc. As such, it is sometimes necessary, while encouraging the resettlers to act in accordance with appropriate technical principles, to accept that villagers will often engage in familiar practices during the stressful period following relocation.

Activities continued at village based agricultural extension and demonstration areas during September, notably at new Sop Hia (Area 8a), Sop Ma (Area 8) and Sop On (Area 19).

Construction of permanent housing progressed well in Boua Ma, Phonsavang and Sop On. There are now 220 houses under construction.

At the end of November 2006, the new villages of Sop On, Phonsavang, Boua Ma, Sop Ma, Sop Hia/Nam Nian (first group), Sop Phene and Sop Ma have been established with all villagers living in their new locations. All of the 142 households of Ban Done, and all of the 52 households of Khone Kaen, are engaged in the clearing of house plots, after having built and relocated to temporary houses on their new plots. Access to Khone Khen and Ban Done is now very good.

#### **Transitional Livelihoods:**

Currently 100% of agricultural plots have been cleared at new Sop On, 100% at new Phonsavang, and more than 50% at new Boua Ma. All the agricultural plots of the 8 Keng Yao families that moved to the Pilot Village have been cleared. These plots were planted with upland rice during the previous wet season, however the irrigation system extension will be completed during the coming months so that these villagers will soon be fully integrated within the pilot village.

Training and assistance in home gardens is on-going and most transition resettlers have productive gardens for home consumption and trade.

The opportunity to supply labor for work associated with village construction is provided to all villages, in addition to food support in the case of transition resettlers.

There remains a full time presence of NTPC and District supervisors and community facilitators in each village.

Most NAKAI activity has now shifted focus from implementation of Transition Relocation to planning and implementation of sustainable livelihood models..

Two schedules are presented in the following pages:

The first schedule shows the phases of resettlement for the various villages listed in order of potential impact by cofferdam and main dam

The second schedule shows progress of the respective tasks associated with resettlement of the same villages.

				Transition																												
				Topo survey	Village layout design (Housing)	Village layout design (Agric.)	up Hill relocation	Access track	UXO temp area	Logging temp housig area	drill wells, hand pumps	Temporar y Schools	Temp. toilets	Building Temp. houses	Commencem ent of Transition Resettlement	Transition Support - food, health, household goods	Target Date - full transition	UXO whole areas	Logging whole area	Road Construct ion	Stump Removal	Clear housing area	Start House Building	Dismantle house and transport	Water Supply	Electricity	Communit y Buildings	Agric land preparatio n	Other non farm activities	Irrigation	Target Date - Permanen t Houses Complete	
New area code	new area	village to move in this area	hh # (2006)																													
N1	8	Ban Hat Khamphane	22				NR										T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N1	8	Ban Sop Ma	23				NR										T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N1	8	Ban Keng Gnao	21				NR										T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N2	16	Ban Keng Gnao	8				NR	NR		NR		NR					T2/06		NR									Jun-07			Feb-07	
N3	19	Ban Sop On	104				NR										T2/06										Dec-07	Jun-07			Dec-07	T2/07
N3	19	Ka Oy	30				NR						Mar-07	Apr-07			T2/07						Feb-07	May-08	Apr-07		Dec-07	Jun-07	Oct-07	Apr-07	Dec-07	T2/08
N4	21	Ban Done	142				NR										T3/06							Mar-07			Jun-08	Jan-08	Apr-07		Nov-08	T4/07
N5	22	Ban Khone Khen	52				NR										T3/06							Mar-07			Jun-08	Jan-08	Apr-07		Nov-08	T4/07
N6	11	Ban Sop Phene	56				NR										T2/06							Jan-07			Dec-07	Jun-07	Apr-07		Dec-07	T4/07
N7	17	Bouama	74				NR										T2/06										Dec-07	Jun-07			Dec-07	T2/07
N8	18	Ban Phonsavang	41				NR										T2/06										Dec-07	Jun-07			Dec-07	T2/07
N15	7	Ban Sop Hia	37					Feb-07		Mar-07	Mar-07	Apr-07	Apr-07	Apr-07	Apr-07	Apr-07	T2/07		May-07	Mar-07	May-07	May-07	May-07	May-07	May-07	May-07	Dec-07	Jan-08	Oct-07	Apr-07	Dec-07	T2/08
N9	8a	Ban Sop Hia (first group)	30														T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N3	8a	Ban Nam Nian (first group)	6														T2/06										Dec-07	Jun-07	Jan-07		Dec-07	T3/07
N10	9	Ban Nong Boua Kham	57				NR	Feb-07		Mar-07	Mar-07	Apr-07	Apr-07	Apr-07	Apr-07	Apr-07	T2/07			Jan-07	Mar-07	Mar-07	Mar-07	May-07	Feb-07	Dec-07	Jun-07	Oct-07		Dec-07	T1/08	
N11	13	Ban Thalang	73				May-07	Mar-07			Oct-07	Oct-07	Oct-07	Oct-07	Nov-07	Nov-07	T1/08			Oct-07	Oct-07	Oct-07	Nov-07	Mar-08	Oct-07	May-08	Nov-08	Dec-07		Nov-08	T1/08	
N12	1	Ban Nakai Neua	89				May-07	Mar-07			Oct-07	Oct-07	Oct-07	Oct-07	Nov-07	Nov-07	T1/08			Oct-07	Oct-07	Oct-07	Nov-07	Mar-08	Oct-07	May-08	Nov-08	Dec-07		Nov-08	T1/08	
N15	7	Ban Nam Nian	25				NR	Feb-07		Mar-07	Mar-07	Apr-07	Apr-07	Apr-07	Apr-07	Apr-07	T2/07		May-07	Mar-07	May-07	May-07	May-07	May-07	May-07	May-07	Dec-07	Jan-08	Oct-07	Apr-07	Nov-07	T2/08
N13	2	Ban Nakai Tai	190				May-07	Mar-07			Oct-07	Oct-07	Oct-07	Oct-07	Nov-07	Nov-07	T1/08			Oct-07	Oct-07	Oct-07	Nov-07	Mar-08	Oct-07	May-08	Nov-08	Dec-07		Nov-08	T1/08	
N4	21	Ka Oy	3				NR								Mar-07		T2/07							Nov-07	May-07		Jun-08	Jan-08	Apr-07	Apr-07	Nov-08	T4 / 07
N14		Ban Oudomsouk / Phon Phan Pek	103+56				NR	NR			Nov-07	NR	NR	NR	NR	NR	NR			Nov-07	Nov-07	Nov-07	Nov-07	Apr-08	Nov-07	Apr-08	NR	Nov-08	May-08	Nov-08	T2/08	
	NR	Not Relevant			P	In procurement						C	Contract signed, mobilization phase				Implementation - On going						Task completed									



### 2.3.2 Infrastructure

There was no rain in December and the four road construction contractors made various levels of progress during the month. Timber house construction has continued at four villages and the UXO search and clearance contractor continued to make good progress.

#### ○ Topographic survey and mapping

All the ongoing topographic survey and mapping contracts were completed during December. There is still survey and mapping required for the area which the ex-Nam Pan Sop Hia and Nam Nian households will be moved to. An area known as Pong Phai, located west of Ban Thalang, has been inspected. However the area is relatively isolated and may not be approved by the various parties concerned.

One important topographic surveying activity that has not been previously reported upon is the setting out of boundary markers for the resettlers' house and agricultural plots. This is an ongoing activity undertaken mainly by the Junior Irrigation Engineers. However there are several outstanding areas that must be completed in the next few months so that resettlers can choose their plots for 2007 wet season cultivation. Therefore a small contract was prepared with a service provider for the two month hire of a Senior Surveyor and a Total Station surveying instrument.

#### ○ Finalization of village location – Village layout Design

Village Development Plans: All VG1 layouts have been completed (except for that portion of Sop Hia and Nam Nian that was previously scheduled to move to Nam Pan). The preparation of layouts for the remaining villages is underway as shown in the table below.

<b>Name of the original villages in VG2</b>	<b>New village area</b>	<b>Village layout</b>	<b>Agriculture Layout</b>
Thalang	Area 13	Complete	Complete
Nakai Tai	Area 2	Complete	Complete
Nakai Neua	Area1	Complete	Complete.
Done	Area 21	Complete	Complete
Khone Khen	Area 22	Complete	Complete
Oudomsouk and Phone Pan Peck	Oudomsouk Urban Area B and Area 15	First draft completed	Underway

#### ○ UXO search and clearance

The contractor continued to make good progress during the month and completed the search and clearance at the Area 13 agricultural area for Ban Thalang, 70.535 ha, finding 114 items of UXO.

From November 2005 to December 2006, the contractor has UXO searched and cleared 1,290 ha of resettlement area including miscellaneous small areas such as for the VFA sawmill and log storage areas, road earthworks borrow areas, cemeteries etc. Found and destroyed have been 1,601 UXO items, including 1,040 bomblets. Including the Khammouane Military contract areas, a total of 1,497 ha have been searched with a total finds of 1,823 items of UXO.

The same contractor also has a contract for "Resettlement Area UXO Community Awareness and Emergency Response Teams." The community awareness activities continue to progress smoothly and the system of villagers preparing response forms and placing them in "drop boxes" provided continues to work. Many educational materials have been prepared and distributed to the villages.

The response team continued to visit villages to check on reported suspect items. To the end of November 2006, 1,793 UXO items, including 1,616 bomblets, have been found and destroyed by the response team. The results for December are not yet available apart from that a large 500 lb. bomb was reported near Oudomsouk.

#### ○ Roads and drainage

The design of access roads and tracks was completed at Ban Thalang Agricultural Area and Oudomsouk Urban Area B and is underway at Nakai Tai and Nakai Neua. The Oudomsouk Urban Area road will probably be awarded to the Southern Resettlement Road Contractor as a Variation

Order. Bidding procedures for the Area 7 and Thalang agricultural area roads will commence in January 2007.

There are four ongoing road construction contracts and with varying degrees of progress during the month.

Southern VG1 Access roads to and within villages:

The works are nearly finished and completion is estimated at about 95% for the construction of access roads to and within the new villages of Bouama (area 17), Phonsavang (area 18) and Sop On (area 19). The main outstanding works are the gravel wearing course on some of the agricultural area access tracks and reinforced concrete inlet and outlet structures for the cross-drainage culverts.

Southern Resettlement Road:

Progress was good on the contract for the construction of the Southern Resettlement Road, 11.765 km long. The construction is now about 80% complete.

Northern Access roads to and within villages:

The contractor has continued work on the construction of access roads to and within the new villages of Sop Ma (area 8), Vietic Sop Hia (area 8a), Nong Boua Kham (area 9), Sop Phene (area 11) and Thalang (area 13) housing area. It is estimated the works are about 83% complete for areas 8, 8a, 9 and 11 and about 5% complete for area 13 housing area which was later added to the contract as a Variation Order.

Southern VG2 Access roads to and within villages:

The contractor has commenced the construction of access roads to and within the new villages of Done (area 21) and Khone Khen (area 22). The Contractor is working on the clearing and tree stump removal on both areas and the contract works are about 10% complete.

○ **House Construction**

Six contracts for the construction of timber houses for VG1 resettlers have been awarded but only four companies have commenced construction and one more has been given site possession in January 2007. The problem is with the delivery of sawn construction wood. It is expected that the situation will improve during January as new sources of timber have been identified.

The situation was such that variation orders for all the six contracts were prepared in November and signed with the contractors in December. The variation orders were for revisions in the number of houses but also to extend the completion dates by a further eight months.

Contract start dates are as follows:

<i>Areas and Villages concerned</i>	<i>Contract No.</i>		<i>Start Date</i>
Area 17 for Bouama Area 16 for Keng Gnao	C604	Area 16	20 March 06
		Area 17	19 May 06
Area 18 for Phonsavang	C605		16 May 06
Area 19 for Sop On	C606		21 April 06
Area 8 for Sop Ma / Hat Khamphane Area 8A for Sop Hia	C607	Area 8a	30 October 06
		Area 8	30 October 06
Area 9 for Nong Boua Kham	C608		deferred until timber supply secured
Area 11 for Sop Phene	C609		10 January 2007

Progress with the various VG1 contracts is as follows:

C604, Areas 17 (Bouama) and 16 (Keng Gnao at Pilot Village): The eight houses for Keng Gnao resettlers at Area 16 are complete and eighty houses and toilet/bathrooms at Bouama are under construction. The contract is about 75% complete with the availability of wall planks the main problem.

C605, Area 18 (Phonsavang): 42 houses are under construction and the contract is about 55% complete

C606, Area 19 (Sop On): 137 houses and bathrooms are under construction and the contract is about 45% complete.

C607, Areas 8 (Sop Ma) and 8a (Sop Hia/Nam Nian): 106 houses and bathrooms are to be constructed and foundation work has commenced.

C608, Area 9 (Nongbouakham): 61 houses and start date deferred.

C609, Area 11 (Sop Phene): 58 houses, notice to proceed given.

Bid procedures for the VG2 house contracts have been ongoing over the previous months and in December a comprehensive bid evaluation report was prepared.



New House in Pilot Village (Keng Gnao resettlers)

Houses under construction in new Sop On



## ○ Community Buildings

Each resettlement village will have a primary and nursery school, village office and meeting hall, market, warehouse and a rice mill and workshop. There will also be two clinics, four seed processing and agricultural storage facilities and four organic fertilizer facilities located at various villages. The sizes of most of the buildings will vary according to village size.

The preparation of bidding documents for the VG1 and some of the VG2a (schools and health centers) buildings is complete. However bidding procedures have not commenced as NTPC is waiting for a letter of no objection from the Bank.

## ○ Domestic Water Supply and Sanitation

As always and previously reported, a resettlement village water supply is a combination of:

- Rainwater collected from house roofs, via guttering and down-pipes to a 2,000 liters capacity tank; and
- Deep machine drilled boreholes equipped with VLOM (Village Level Oriented maintenance) hand pumps.

Toilet/bathrooms are and will be installed at every house and in some selected community buildings. The construction of the VG1 resettlers' rainwater collection facilities and toilet/bathrooms is included with the housing construction contract. The construction of these toilets/bathrooms is completed for the 8 new Keng Gnao resettlers' families in Ban Nong Boua Pilot Village.

The same constraints than the ones met for the houses constructions still prevail for the toilet/bathrooms construction.

### Boreholes with hand pumps:

The recapitulative progression for December 2006 and the summary of the actual performance vs initial and revised 6<sup>th</sup> update plan (based on the continuous reconciliation of the data on resettlers' population) are included in the following pages along with a tentative schedule of planned interventions for the next 4 months. This following summary also includes the boreholes drilled for the benefit of Project Affected Persons (PAPs) by the construction of the Nam Theun 2 infrastructure (ref. Table 1 "Project lands") as well as those under the health infrastructure rehabilitation plan (ref. Table 3).

A total of 6 successful boreholes were completed during December as described in the following recapitulative tables. As of the end of this reporting period, an actual total of 127 deep boreholes are successfully completed out of 142 drilled since the beginning of the operations in December 2005 with the Champasack Provincial Nam Saat drilling teams. The failure rate of about 10.5% has slightly increase this month due to the abortion of 3 tentative in area 11 (Sop Phene) due to insufficient yield. However, this rate remains still acceptable.

With regard to the next implementation schedule, the major addition is the area 7 now being included within the next 4 months plan, as it is now strongly expected that the majority ,if not the whole, of the remaining population of Sop Hia and Nam Nian will relocate to this area..

2) The coverage targets are still expected to be reached in end of January 2007 in Sop Phene (area 11) as well as in the 7 villages which are finalized under the Project Lands interventions. The full completion in Sop Hia (area 8a) and Ban Nongbouakham (area 9) has to be postponed to February.

As previously reported in November, the main constraint remains the hand pumps installation that will allow the utilization of these wells. There are still only 66 hand pumps which have been installed, The imported Afridev VLOM deep well hand pumps ordered to UNICEF Supply Division through the National Water Supply and Environmental Health Programme (necessary arrangement due to non-eligibility of NTPC to access directly to UNICEF Procurement Services) are still not yet delivered to Laos. The procurement process lasts since May 2006 and has been quite complicate on administrative aspects. Finally, a Purchase Order has been issued by UNICEF India on 10 November 2006 which provides expectation for delivery to Laos not before January 2007 the earliest.

As a collateral result of the hand pump supply situation, the on-going contract with Champasack Nam Saat is now to be extended to the end of March 2007 instead of February as previously

reported. February and March 2007 period will be mainly utilized for the complete and proper installation of the hand pumps, provided that can be made available on the field at the end of January

It is still planned to establish another contract to cover the remaining VG2b, VG3 and VG4 with starting date delayed until March 2007 immediately after the completion of the current contract.

**Nam Theun 2 Power Company Ltd**

**ENVIRONMENTAL AND SOCIAL DIVISION**

**NTPC - Construction of machine drilled boreholes for domestic water supply**

**CONTRACTOR:**

Provincial Public Health Department

Champasack Province

Environmental and Water supply Section

**RECAPITULATIVE MONITORING DRILLING PERFORMANCE**

**SITUATION ON MONTH OF: DECEMBER 2006**

RECAPITULATIVE TABLE No 1: "Project Lands"								Balance vs plan		Total Completion								
			Initial plan - Dec 2005		Temporary Revised 6th Plan	Productive	Equipped	Total BHs drilled	Productive	Equipped	Failures	Failures	Completion December 2006					
			Option average coverage 8 Houses/BH	Difference initial plan vs temporary revised 6th plan	Option average coverage 8 Houses/BH	Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	% of total drilled	Productive	Equipped	Failure			
No	New Area	Villages	Total Qty	Total Qty	Total Qty													
1	ODS New Urban area A (Oudomsouk May)	Oudomsouk SD12B PAPs	9	1	10	0	1	10	10	9	0	0.00						
2	ODS New Urban area C (Primary School)	Oudomsouk SD12B PAPs	1	0	1	0	0	1	1	1	0	0.00						
3	ODS	Oudomsouk SD12B PAPs - ODS old areas 8, 7 and market	5	0	5	0	0	5	5	5	0	0.00						
4	PPP	Pon Pan Pek - Intake PAPs	5	0	5	0	0	5	5	5	0	0.00						
5	NRC	NRC Oudomsouk	0	1	1	0	1	1	1	0	0	0.00						
6	GML	New 8 Houses GML	0	1	1	0	1	1	1	0	0	0.00						
7	GML	GML Horticulture Demonstration Center	0	1	1	1	1	0	0	0	0							
8	GML	Gnommalath Tay	0	1	1	1	1	0	0	0	0							
9	GML	Gnommalath Neua	0	1	1	1	1	0	0	0	0							
10	GML	Ban Lao Naa Ngam	0	1	1	1	1	0	0	0	0							
11	GML	Ban Phone Lath Khouey	0	1	1	1	1	0	0	0	0							
12	GML	Ban Tongmang	0	1	1	1	1	0	0	0	0							
13	GML	Ban Sangkeo	0	1	1	1	1	0	0	0	0							
14	xxx	Others - ESTIMATE QUANTITY - To be finalized and adjusted during implementation period <u>as per demand</u> .	22	0	22	22	22	0	0	0	0							
SUB TOTAL Project lands			42	10	52	29	32	23	23	20	0	0.00	0	0	0			

RECAPITULATIVE TABLE No 2: "Nakai Plateau resettlement"						Balance vs plan		Total Completion								
			Initial plan - Dec 2005		Temporary Revised 6th Plan	Productive	Equipped	Total BHs drilled	Productive	Equipped	Failure	Failures	Completion December 2006			
			Option average coverage 8 Houses/BH	Difference initial plan vs temporary revised 6th plan	Option average coverage 8 Houses/BH	Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	% of total drilled	Productive	Equipped	Failure	
No	New Area	Villages	Total Qty	Total Qty	Total Qty											
1	16	Ban Nongboua, Keng Nyao (PV)	7	1	8	0	3	8	8	5	0	0.00				
2	17	Ban Bouama	11	0	11	2	4	15	9	7	6	40.00				
3	18	Ban Phonsavang	8	-1	7	0	0	8	7	7	1	12.50				
4	19	Ban Sop On	17	2	19	0	8	19	19	11	0	0.00				
5	8	Ban Sop Ma, Hatkhamphan, Keng Nyao	11	0	11	0	7	11	11	4	0	0.00				
6	8a	Ban Sop Hia Vietic	7	0	7	2	4	8	5	3	3	37.50				
7	9	Ban Nong Boua Kham	10	1	11	11	11	0	0	0	0					
8	11	Ban Sop Phene (incl. additional 2 BHs for temporary relocation)	9	2	11	3	10	11	8	1	3	27.27	6		3	
9	21	Ban Done	22	1	23	0	15	24	23	8	1	4.17				
10	22	Ban Khon Kaen	8	1	9	0	9	10	9	0	1	10.00				
11	1	Ban Nakai Tay	27	0	27	27	27	0	0	0	0					
12	2	Ban Nakai Neua	14	-1	13	13	13	0	0	0	0					
13	13	Ban Thalang	12	0	12	12	12	0	0	0	0					
14	7	Ban Sop Hia/ Nam Nian	11	-1	10	10	10	0	0	0	0					
15	KK	Ban Sop Hia/ Nam Nian	0	0	0	0	0	0	0	0	0					
16	xxx	Oudomsouk	15	-1	14	14	14	0	0	0	0					
17	PPP	Ban Pon pan Pek	0	2	2	2	2	0	0	0	0					
SUB TOTAL Resettlement villages			189	6	195	96	149	114	99	46	15	13.16	6	0	3	

RECAPITULATIVE TABLE No 3: "HEALTH INFRASTRUCTURE"						Balance vs plan		Total Completion								
			Initial plan - Dec 2005		Temporary Revised 6th Plan	Productive	Equipped	Total BHs drilled	Productive	Equipped	Failure	Failures	Completion December 2006			
				Difference initial plan vs temporary revised 6th plan		Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	Cumul to date	% of total drilled	Productive	Equipped	Failure	
No	District	Buildings	Total Qty	Total Qty	Total Qty											
1	Gnommalath	Gnommalath Hospital	1	0	1	0	1	1	1	0	0	0.00				
2	Gnommalath	Khed Phit Health Center	1	0	1	0	1	1	1	0	0	0.00				
3	Gnommalath	Nadou Health Center	1	0	1	0	1	1	1	0	0	0.00				
4	Gnommalath	Nasok Health Center	1	0	1	0	1	1	1	0	0	0.00				
5	Kamkeuth	Kaeng Deng Health Center	1	0	1	0	1	1	1	0	0	0.00				
SUB TOTAL Health Infrastructure			5	0	5	0	5	5	5	0	0	0.00	0	0	0	
GRAND TOTAL			236	16	252	125	186	142	127	66	15	10.56	6	0	3	

Construction of machine drilled boreholes for domestic water supply in:

- 1) Resettlement Villages New Areas - Nakai District, Khammouane Province
- 2) Health Centers and District Hospitals - Gnommalath Dist., Khammouane Prov. and Khamkeuth Dist., Bolikhamsay Prov.
- 3) Project Land areas - Nakai and Gnommalath Districts, Khammouane Province

### INDICATIVE GENERIC TENTATIVE SCHEDULE OF IMPLEMENTATION

#### DRILLING AND EQUIPPING BOREHOLES OF MINIMUM 30 METERS AND MAXIMUM 60 METERS DEPTH

		General Data			2007 - 4 months Tentative schedule					
New Area	Name of Village/Health Center/Hospital	Maximum Qty required (cov. 1/8HHs)	Qty already completed on date	Maximum Qty completion balance on date	Jan. C675 2 rigs	Feb. C675	Mar. C675 Cxxx	Apr. Cxxx	Diff. perform. vs Max. Qty required on date	Remarks
1- Resettlement areas										
16	Ban Nong Boua (PV) (incl. additional 1 BH for 5 families)	8	8	0					0	Maximum Qtys target completed on date.
17	Ban Bouama	11	9	2					-2	Further sites selection needed. Balance 2 BHs possibly completed under other contract.
18	Ban Phonesavang	7	7	0					0	Maximum Qtys target completed on date
19	Ban Sop On	19	19	0					0	Maximum Qtys target completed on date
8	Ban Sop Ma/ Hatkhampan/Keng Nyao	11	11	0					0	Maximum Qtys target completed on date
8a	Ban Sophia Vietic	7	5	2		2			0	
9	Ban Nong Boua Kham	11	0	11	5	6			0	Depending on land preparation completion
11	Ban Sop Phene (incl. additional 2 BHs for temporary relocation)	11	8	3	3				0	
21	Ban Done	23	23	0					0	Maximum Qtys target completed on date
22	Ban Khon Kaen	9	9	0					0	Maximum Qtys target completed on date
	SUB TOTAL 1 PHASE 1	117	99	18	8	8	0	0	-2	
xxx	Oudomsouk	14	0	14					-14	Not before 2nd half of 2007
	Pon Pan Pek	2	0	2					-2	Not before 2nd half of 2007
2	Ban Nakai Tai	27	0	27			3	5	-27	Contract not yet issued
1	Ban Nakai Neua	13	0	13			3	5	-13	Contract not yet issued
13	Ban Thalang	12	0	12			3	5	-12	Contract not yet issued
7	Ban Sop Hia/Nam Nian	10	0	10	3	2			-5	On VO cont. C675 - Incl. in Phase 1
xxx	Ban Sop Hia/Nam Nian	0	0	0					0	Move to area 7
	SUB TOTAL 2 PHASE 2	78	0	78	3	2	9	15	-73	
Total 1 resettlement areas		195	99	96	11	10	9	15	-75	Possible BH drilling in march not under C675 contract
2- Health Centers and District Hospitals										
GML	Gnommalath Hospital	1	1	0					0	Maximum Qtys target completed on date
GML	Khed Phit Health Center	1	1	0					0	Maximum Qtys target completed on date
GML	Nadou Health Center	1	1	0					0	Maximum Qtys target completed on date
GML	Nasok Health Center	1	1	0					0	Maximum Qtys target completed on date
KK	Kaeng Deng Health Center	1	1	0					0	Maximum Qtys target completed on date
Total 2 Health Infrastructure		5	5	0					0	

		General Data			2007 - 4 months Tentative schedule					
New Area	Name of Village/Health Center/Hospital	Maximum Qty required (cov. 1/8HHs)	Qty already completed on date	Maximum Qty completion balance on date	Jan. C675 2 rigs	Feb. C675	Mar. C675 Cxxx	Apr. Cxxx	Diff. perform. vs Max. Qty required on date	Remarks
3- Project lands										
	Oudomsouk May - Area A - SD12B	10	10	0					0	Maximum Qtys target completed on date
	Oudomsouk Primary school - SD12B	1	1	0					0	Maximum Qtys target completed on date
	Oudomsouk old village - SD12B	5	5	0					0	Maximum Qtys target completed on date
	Pon Pan Pek intake PAPs	5	5	0					0	Maximum Qtys target completed on date
	NRC (Nakai) (total 3)	1	1	0					0	Maximum Qtys target completed on date
GML	New 8 Houses (GML)	1	1	0					0	Maximum Qtys target completed on date
GML	Gnommalath horticulture demonstration center	1	0	1	1				0	
GML	Gnommalath Tay	1	0	1	1				0	
GML	Gnommalath Neua	1	0	1	1				0	
GML	Ban Lao NaaNgam	1	0	1	1				0	
GML	Ban Phonlathkhoeuy	1	0	1	1				0	
GML	Ban Tongmang	1	0	1	1				0	
GML	Ban Sangkeo	1	0	1	1				0	
	Others - To be finalized and adjusted during implementation period	22	0	22					-22	Location and Quantities Not included in schedule - Locations and required quantities to be finalized on a case by case basis according to demand
Total 3 Project lands		52	23	29	7	0	0	0	-22	
GRAND TOTAL PLANNED		252	127	125	18	10	9	15	-97	

Update 29.12.2006

Expected maximum remaining implementation period for contract C675

Only HP installation activities

### ○ Irrigation Systems

The construction of the extension area to the Pilot Village irrigation scheme for the resettlers from Ban Keng Gnao resumed in November and the Contractor has made reasonable progress with completion expected in early February.

The preparation of irrigated agricultural layouts is an important part of the resettlement village planning exercise and this has been reported on above.

Permanent irrigation agriculture cannot commence until there are transmission lines are installed to power the irrigation pumps until there is Nakai Reservoir water to pump from (apart from areas 17, 18 and 19, which will have the use of water from the Theun Duane and Houay Malai).

It has been decided to undertake the construction of a pilot irrigation area at Sop On (area 19) using ground water for irrigation. The design of the systems is underway.

### ○ Electricity

The installation of the transmission lines is continuing at the VFA Sawmill. Between supervising these contracts plus the contract for the NTPC Nakai Residential Complex, the Senior Electrical Engineer is continuing with the preparation of design, layouts and quantity estimates for the resettlement villages. To date designs have been completed at five villages and are ongoing at two more.

The preparation of bid documents for the installation of the village distribution systems at Bouama, Phonsavang and Sop On will commence in January.



### 2.3.3 Livelihood

- Communication

No change from previous report.

- Staffing

No change from previous report.

- Institutional strengthening

No change from previous report.

- Land allocation

No change from previous report.

#### 2.2.3.1 Nakai Plateau Forestry Development Program

- Logging

##### **Cutting, Skidding and Transportation to 2<sup>nd</sup> Yard**

• Cutting (Thalang, NamNian, NakaiTai, Neua	Logs	1,202	958.270 m3
• Cutting (Sop On, Houayen, Road 8B	Logs	494	432.927 m3
• Total (December)	Logs	<b>1,695</b>	<b>1,391.197 m3</b>
<b>Total (Oct-Nov-December)</b>	<b>Logs</b>	<b>3,790</b>	<b>2,916.048 m3</b>

**Transportation 2nd Yard to Nakai Sawmill :** No change

**Transportation Logs to Lak 20 Sawmill :** No change

**Contract signed with different contractors:** No change

- Sawn timber

No change

- Charcoal & Brick making

No change

- Furniture Making

No change

- Silviculture (Plantation, Nursery, Enrichment)

Total grass seed harvesting :

- Eleusine : 344 kg
- Brachiaria Ruzi 372 kg



*Villagers harvesting seeds in Phonphanpek plantation (this tree plantation has been enriched with leguminous and forage in July 2006 in order to implement the agro-sylvo-pastoralism approach developed)*

### **2.2.3.2 Nakai Plateau Agricultural and Livestock Development Program**

During the month of December, a big work of reorganization of the entire component of the Program had been made by the Technical Assistants and the Team Leader. The main points as following:

- 96 people are currently working on the Agriculture / Livestock program. Following the program assessment made in October 2006 by the TAs, a new organization chart has been defined and agreed, with 4 main components: the direction team (3 people), the field unit (52 people), the center of production of trees (9 persons), the support unit (8 people), and the administrative unit (7 people). The A/L will be composed of 80 people.

To set up this new organization:

- o The process for the recruitment of the new staff started since in November (support unit and supervisors of area; supervisors of area)
- o The Job description and the TORs have been written in December (individual objectives for the next quarter will be written in January).
- Training session :
  - o After the session of 20 and 21 November (definition of the base of Agroecology), the 12<sup>th</sup> December, a training on the method to prepare the field has been carried out. 65 NTPC staff and DAFO (including 18 people from CD team) attended the session. This training was based on some specific plot in Bouama (method to prepare the land), and in Nong Boua (culture of vegetable with DMC technique).
- The A/L team moved in a new office, inside the new complex, in Nakai. This larger and more suitable office permitted to have a quicker and better reorganization of the team.
- Definition of the technical program for the whole year 2008.
- Definition of the budget for the period 2008/2014, with the template and basis created in June 2006 by the livelihood coordinator and the livelihood advisor

○ Transition resettlement villages

Activity	Input / Support	Output / Result	Assessment
1. Establishment of temporary vegetable garden	<p>Provided continuously vegetable seed and seedlings as follow:</p> <p><b>SEED:</b>  Morning glory: 25 kg  Long bean: 2.5 kg  Coriander: 12.5 kg  Cucumber: 1.2 kg  Pakchoy: 2.3 kg  Chinese cabbage: 0.15 kg  Lettuce: 0.12kg  Dill: 0.5 kg</p> <p><b>SEEDLING:</b>  Cabbage: 380 seedling  Cauliflower: 155 seedling  Broccoli: 354 seedlings  Eggplant: 123 seedling  Tomatoes: 259 seedling  Provided 7,200 kg of Bio-fertilizer and 90 liter of Effective Micro-organism (EM)</p>	<p>The dry season vegetable is continuously grown in the temporary garden around the house by using borehole water</p> <p>The temporary vegetable garden is completed in each resettled village and every household as well and this activity is going-on.</p> <p>Produced some vegetables at the three resettled villages (Sop Phene, Sop Hia and Sop Ma) as follows:</p> <p>Pakchoy: 62.5 kg  Onion: 58.5 kg  Coriander: 11.5 kg  Morning glory: 8 kg  Long bean: 25 kg  Mint: 15 kg  Lemon grass: 10 kg  Eggplant: 253 kg  Tomato: 133 kg  Lettuce: 25  Cabbage: 15  Cauliflower: 8 kg  Chili: 14 kg</p> <p>Another 3 resettled village are produced several vegetable as follow:</p> <ul style="list-style-type: none"> <li>• Sop On: 409 kg (43 hh)</li> <li>• Boua Ma: 129 kg (73 hh)</li> <li>• Phonsavang: 240 kg (22 hh)</li> </ul>	<p>The trial irrigation system has been designed by infrastructure team to be installed at Sop On.</p> <p>Vegetable cultivation is mainly for house consumption and the surplus product can be sold as household income.</p> <p>Compost production technique is already trained for 25 households of Sop Ma and 22 households of Sop Hia respectively.</p> <p>The plan is continuously to train several ago-technique particularly sustainable agriculture technique (DMC) for every household of each resettled village and then they can do it themselves after the project is finished</p>
2. Crop seed supply and Fruit trees distribution	<p>Vegetable seed were distributed to transition resettlement village are mentioned above.</p> <p>The need assessment of fruit trees plantation of the resettlers at Boua Ma is already completed</p>	<p>16 households of Boua Ma needs 56 fruit trees seedlings of mango and 30 litchi seedlings and now the resettlers preparing the land to grow it.</p>	Follow up and on-going
3. Agriculture land clearing	Regarding the DMC technique we conducted two demonstration plots on agriculture land clearing at Boua Ma in order to show a new approach to resettlers while we also estimated the compensation of		Setting up the implementation plan for each village and follow up.

Activity	Input / Support	Output / Result	Assessment
	such activity for the resettlers that it will be used for every resettled village		
4. Agriculture land fencing	Not started yet but we are starting very soon.	The agriculture land fencing will be used the wood (local material) instead barbed wire. Based on the sustainability of agriculture we already conducted demonstration on the agriculture land fencing at Boua Ma and the fence will also be grown the trees as living fence in the coming wet season	Follow up
5. Household income from surplus vegetable production	As we know that the main objective of temporary vegetable garden is only for house consumption but some households have some surplus production for selling and earned a small income.	<p>Some households sold several vegetables from their owner temporary garden and get some income as follow:</p> <p>At Sop On, 107 households earned 1,981,000 kip</p> <p>At Phonsavang, 44 households earned 1,303,000 kip</p> <p>At Keng Gnao, 8 households earned 310,00 kip</p> <p>At Boua Ma, 74 households earned 1,706,000 kip</p> <p>At Sop Hia, 36 households earned 2,228,500 kip</p> <p>At Sop Phene, 56 households earned 596,500 kip</p> <p>At Sop Ma, 74 households earned 1,064,500 kip</p>	On-going and follow up
6. Contour bunding	Based on the new approach of agriculture and livestock program is not necessary to build the contour on the slopping land because we will grow the cover crop to protect the soil erosion and also for soil fertility improvement.		It will be grown the cover crop in the coming wet season 2007
7. Mushroom production	<p>Provided 2,200 bags of sawdust mushroom spores to the resettled village as follow:</p> <p><b>Boua Ma:</b> 800 bags (4 hh)</p> <p><b>Sop Ma:</b> 400 bags (2 hh)</p>	<p>Mushroom is produced by village as follow:</p> <p><b>Boua Ma:</b> 103 kg and earned 620,000 kip (13 hh)</p> <p><b>Phonsavang:</b> 11 kg</p>	Mushroom production is one important component of familial food security and very suitable for every household even vulnerable household. Follow up and continue

Activity	Input / Support	Output / Result	Assessment
	<b>Sop Phene:</b> 400 bags (2 hh) <b>Keng Gnao:</b> 600 bags (2 hh)	<b>Sop On:</b> 44 kg and earned 50,000 kip (2 hh) <b>Sop Ma:</b> 19 kg and earned 50,000 kip (1 hh) <b>Sop Phene:</b> 24 kg and earned 214,000 kip (4 hh) <b>Sop Hia:</b> 21 kg and earned 100,000 kip (3 hh) <b>Keng Gnao:</b> 51 kg and earned 98,000 kip (5 hh) <b>Ban Done:</b> 1,000 bag (5 hh) 18 households of Sop Hia already got a training on mushroom production from the agricultural extension center at Sop Hia	to promote. We had a plan to conduct the training for 4 households per week on mushroom production for the resettlers of Sop Hia, Sop Ma and Sop Phene but firstly we should be finished of such training for sop Hia.
8. Buffalo relocation	As we known this coming wet season will be flooded widely more than last year. So, in collaboration with RMU and DWG, we are still preparing the plan to relocate the remaining buffalo "khouay Hae" approximately 500 heads are now free grazing in the forest particularly at Ban Done, Khone Kaen, Sop On and Boua Ma		Follow up. We are now clarifying the data on livestock of Nakai plateau in order to setting up the plan to minimize the number of buffalo before the NT reservoir will be full up.
9. Buffalo shed	Based on the new approach, we should change the specification of buffalo shed and the compensation as well	Conducted demonstration of buffalo shed at Sop On and we also calculated the optimum compensation rate of the shed to be paid to the resettlers.	Follow up
10. Poultry and pig shed	As same situation as buffalo shed		Follow up
11. Animal Vaccination	Supplied the animal vaccine to the resettled village including four (4) pre-resettlement villages (Nakai tai, Nakai Neua, Thalang, Nong Boua Kham)	Animal were vaccinated during the month of December as follow: Buffalo: 145 heads Pig: 76 heads Poultry: 1,179 heads	On-going and follow up

### ○ NB-Pilot Village

The vegetable cultivation is going on throughout the year. Based on the new approach, we are conducting DMC technique at the vegetable plot in order to train in practice the extension worker and villager at the field level. The major vegetable is grown in dry season such as: cabbage, cauliflower, broccoli, onion, lettuce, pakchoy etc.

### ○ NB-Agricultural Extension Centre (Zone I)

Based on the new approach of Agriculture and Livestock Program, we have to change the objective of the agricultural extension center that will be undertaken only two activities such as: trial on crop / agro-technique and crop seed multiplication and this new approach will be implemented from the beginning of the year 2007.

Activity	Input / Support	Output / Result	Assessment
1. Bio-Fertilizer production		Produced 9,980 kg of Bio- fertilizer 4,260 kg of which is produced by the villager of pilot village. Produced also 270 liter of Effective Micro-organism (EM). 410 kg of Bio- fertilizer were distributed to the transition resettlement villages (Ban Done, Boua Ma and Sop On) and also provided 1,250 kg to Keng Gnao. We have now 6,660 kg of Bio-fertilizer in the stock.	Based on the implementation of the new approach, the Bio-fertilizer and EM production will be terminated to produce within the month of January, 07 but we encourage the resettlers to produce compost fertilizer directly at their own village
2. Vegetable seed and seedlings supply	Provided several vegetables seed to the transition village such as: Cabbage: 0.3 kg Cauliflower: 0.23 kg Broccoli: 0.12 kg M. glory: 22 kg Tomato: 0.02 kg Longbean: 0.05 kg Pakchoy: 1.2 kg And another several vegetables seed	The vegetable seed were distributed to: NB-Pilot village: Cabbage: 0.15 kg Tomato: 0.01 kg Morning glory: 6 kg Chili: 0.2 kg Broccoli: 0.02 kg Pakchoy: 0.19 kg Cauliflower: 0.04 kg Coriander: 11 kg Spinach: 0.08 kg	On-going and follow up.  Vegetable seedling is now producing at the each village and then will be distributed to the resettlers.
3. Mushroom production	Produced 5,160 bags of sawdust mushroom spore	2,800 bag of sawdust mushroom spore were distributed to the transition villages including pilot village as follows:  Boua Ma: 800 bags Sop Ma: 400 bags Sop Phene: 400 bags Nong Boua: 600 bags Keng Gnao: 600 bags	On-going and follow up
4. Livestock raising	Continuing to produce the pig and poultry to supply to the resettlers. The total number of livestock in the center is follows: <ul style="list-style-type: none"> <li>Pig: 12 heads (including 9 piglets)</li> <li>Chicken: 66 heads</li> <li>Cattle: 3 heads</li> </ul>	Hatching 15 chickens.	Follow up



*DMC technique on cabbage and chili cultivation at NB- Agricultural Extension Centre*

○ Theun Douan-Agricultural Extension Centre (Zone II)

Activity	Input Support /	Output / Result	Assessment
1.Bio-fertilizer production		Produced 20 liter of effective micro-organism liquid (EM) and 1,500 kg of Bio-fertilizer.  Bio-fertilizer were distributed to: Boua Ma: 300 kg Phonsavang: 620 kg	Bio-fertilizer production should be terminated within the month of January,07 due to new approach implementation
2.Mushroom production	Produced 1,200 bags of sawdust mushroom spores	Supplied 1,300 bags of sawdust mushroom spores to the transition resettlement villages as follow: Ban Done: 1,000 bags	Still continuing to encourage resettlers to grow mushroom. We will have a plan to conduct directly the training (learning by doing approach) on mushroom production for the resettlers at their own village as same as doing now at Sop Hia village. Up to date, 19 households have been trained.
3.Fruit trees propagation		Produced 56 grafted branches of mango and 100 grafted branches of litchi.	To be distributed continuously to the resettlers in next month
5. Poultry raising		Poultry raising demonstration is on-going but we should remove most livestock from the center within the month of January,07 due to new approach implementation	Follow up
6. Crop seed multiplication	Continuing to conduct demonstration plot on several crop and also crop seed multiplication	Seed multiplication is conducted in the planted area as follow: Chilli: 250 m2 Eggplant: 350 m2	On-going and follow up

### ○ Nakai Neua - Fruit Trees Propagation Centre

Activity	Input / Support	Output / Result	Assessment
1. Distribution of fruit trees grafted branches	This month we did not distributed any fruit trees seedlings but we conducted only the survey of the interested resettlers who wants to grow fruit trees around their house at this moment	Actually, dry season is not suitable season to grow any fruit trees in Nakai plateau due to no irrigation water	Follow up
2. Grafted seedling production		Produced the grafted branches: <ul style="list-style-type: none"> <li>• Mango: 333</li> <li>• Lemon: 59</li> <li>• Litchi: 45</li> </ul>	The grafted branches are not yet cut out from parent plants as follow: Mango: 2,594 Lemon: 1,704 Litchi: 561 Jack fruit: 113 Pomelo : 200
3. Fruit trees seedlings in the nursery	We have some fruit trees grafted branches in the nursery which is ready to distribute to the resettlers as follow: Mango: 2,628 Mandarin: 537 Lemon: 7,118 Litchi: 1,548 Jack fruit: 187 Rose Apple : 420 Pomelo : 2,730		To take care and Follow up
4. Bio-fertilizer production	Produced 2,440 kg of Bio-fertilizer and Effective micro-organism liquid 100 liter	Most Bio-fertilizer is applied into fruit trees plantation in the center at amount 1,480 kg	The target plan is to produce at least 2,000 kg per month of Bio fertilizer

### 2.2.3.3 Fisheries Reservoir Program

No change from previous report.

### 2.2.3.4 Community Development Program

December is rather a month to accelerate the activities to wrap up the year 2006. Off-farm activities were evaluated to be strengthened and to accelerate the process to meet the urgent need of villagers and according to their wish and possibility to be realized. These activities will add to their family incomes. However a lot more has to be done by the year 2007.

Another long lasting issue is Sop Hia /Nan Nian who had always difficulties in making their mind where to go (between Khamkeut and Nakai) and yet they kept on changing all the time. It seems this time it will be final with some going to Khamkeut still (with reduced number from the previous decision), 3 households going to Hinboun district, some coming to Area 7 (Nakai) and around 17 households wishing to go to new area (Poung Phai), but this has to be further feasibility studied. However, this has to be officially confirmed by RC.

Nakai Tai and Nakai Neua village layout is final now. Even though they decided to be merged as one single village, the village layouts are still kept separate (about 4 to 6 Km far from each other).



During the whole dry season, the remaining old materials and belongings of the resettlers will be transported to new sites to avoid flood impacted by the main dam construction, which is due to be completed by end this dry season.

Ka Oy villagers are now moving to new Sop On and Ban Don to avoid also the flood impacted by the main dam. They will all move to new site by end of February 2007. Some of Sop Phene villagers will move to permanent housing area to avoid overcrowded and with better water supply from deep wells.

Rice and protein supports are still delivered to villagers. Policies to phase out are still developed by the DWG and RMU. The idea is when villagers can have sufficient incomes, then rice and protein support can be reduced or stopped. Survey about this is being conducted.

Grievance filing system is being upgraded for village Team to be more effective and have good incentives to work. Training on cases management has been conducted to the Grievance Team members.

Vulnerable households and people are being supported based on their need and capacity to do some suitable work. 2007 will be more appropriate time to support more households and individuals, since more of resettlers move to new sites already.

Warm clothes were distributed to Sop Phene villagers. More villagers in all relocated villages will receive also warm clothes within this first week of January 2007.

#### ○ Non-farm CD

Revolving funds for weaving at Sop Hia – Area 8a {12 funds were released: six persons - for Lao skirt (395,500 kip/fund), five persons – for Lao coating (265,000 kip/fund), one person - for napkin 118,000 kip/fund)}

Barber trainings were organized on 19-21/12/2006 at Sop On village and 2 more days at Bouama village. Some children and pupils at the villages were allowed to test the trained barber trainees (68% average). All of the trainees will open small barber shops at their village as a source of incomes in the near future. At the same time we handed over hairdressers' material to trainees. Revolving funds for Barber trainees 210,000 kip / person (7 funds). The funds will be returned at 30,000 kip per month to the village fund committee.

One set of barber fund: clipper, thinning scissors, haircutting scissors, edge, and one set of Comb, neck brush and miscellaneous)

Tailoring funds at the Sop on, Bouama and Phonsavang were monitored.

On 14th December 2006 – discussion meeting about revolving fund or development fund for Nakai Resettlement villages was organized at the district meeting room (16 attendants, 3 women). On meeting agreement to establishment "Pasason Fund" at each village in resettlement village and will be started at first quarter of the year 2007.

#### **Micro-credit:**

Village saving groups have been monitored in November in 8 villages (212 members) – Attachment SG table.

Consultation with Khone Kaen and Done village to save money in the BCEL bank - Khammouane branch. (Done village - 93 families: 5,550,000 kip, Khone Kaen village- 44 families: 7,700,000 kip). This is a first step for the people to get used to the banking system and the benefits derived from it. This will also lead to the village development fund establishment in the near future.

#### **Rice and Food support:**

Continuous Monitoring and provision of rice, protein at SopOn, Phonsavang, Bouama, SopMa, Nongboua extension, Sop Phene, SopHia- Area 8a, Done, Khone Kaen (9 villages – 2,805 persons= 43,218 kg).

Protein: once per week (fresh meat or fish 560 kg/per week, dry meat or dry fish 560 kg/per week, 56,000 eggs/ per week).

Discussion was also organized on how to phase out the rice and protein support, which will depend very much of the resettlers' incomes after relocation.

**Gender**

Monthly meeting of Gender Mainstreaming Team – on 18th December 2006, 12 attendants (3 men)

○ ICD

Activities / Locations	Dates	Participants	Outputs/ Results
Follow up relocation activities for Ban by Conduct workshop )	7/12/06	SRO: 3 pers. DWG: 1 per Village authority: 5 pers.	All villagers implemented the relocation planning activities
Conduct training on Development concept and Management in the Southern villages for LNFC and VRC: Ban Sop One and Ban Phonsavang (at village level)	8/12/06	SRO: 3 pers. DWG: 3 pers. Villagers: 12 pers. ( 1 women)	All understand and adopt Development concept and Management procedures
Bane Village house plots selection consultation	11 /12/06	SRO: 3 pers. DWG: 2 pers. Villagers: 36 pers. ( 5 women)	All understand and agree with the Bane Village house plots selection consultation. .
Conduct meeting on VG1 villagers' income at District level.	13 /12/06	RMU: 1 pers. SRO: 3 pers. DWG/CD: pers. Villagers: 20 pers. ( 3 women)	All understand and adopt with the VG1 villagers income planning
The second Ban Sop Phene Relocation Village planning activities consultation	18 /12/06	SRO: 3 pers. DWG: 3 pers. Villagers: 46 pers. ( 17 women)	All understand and agree with the second Bane Sop Phene relocation village detail planning activities.
Ban Sop Hia / NamNian village location consultation	21 /12/06	RMU: 2 pers. SRO: 3 pers. Villagers: 27 pers. ( 9 women)	17 pers. to new area ( Nam Pong Phay ), 7 pers. to area 7 and 3 pers. to Hinboun District Yet to be reconfirmed by RC

**Grievance:**

Grievance committee meeting – filling system (Thalang, Sop Phene, SopMa, Sop Hia, Nongbouakham, Nakai Tai, Nakai Neua and SopOn) at the same time we handed over all of filing system material for each village (4 filing Folders, correction pens, rulers, document in/out books, punches, staples, books and pen). This is to support the village grievance staff to work more effectively.

**Vulnerable Households and people**

Vulnerable held a planning meeting (district level) on 19th December, 10 attendants 2 women – all agreed to:

- How to support vulnerable families as requested. This has to check the real needs;
- Make a budget plan to help vulnerable on first quarter year 2007.



*Ban Sop On and Ban Phonsavang - Development concept and Management training participants ( 8 /12 / 2006 )*



*resettlers prepared local construction materials before moving down the river to new site in Sop On*



*Transported to new site by timber ferry down the Nam On river, then Russian trucks will pick them up at the river bank*

**Village Saving Groups (November 2006)**

No	Date	Village	No. member to debt	Old balance	Deposit	Interest	Receive from Mngt	Rec. from capital	No. Loan (person)	Loan (Month)	Admin Fees	Total Loan	Total Fund	Withdraw capital
1	20/11/06	Nongboua	24	115,000	235,000	470,000	19,000	1,239,000	2	700,000	0	9,600,000	10,139,000	0
2	15/11/06	Sop On	24	101,000	515,000	208,000	11,000	2,935,000	1	2,800,000	1,000	52,720,000	5,456,000	0
3	28/11/06	Bouama	25	2,078,500	175,000			2,353,500	0	0	0	0	2,353,000	0
4	5/11/06	Nongboua kham	21	22,000	935,000	455,000	6,000	2,418,000	2	2,380,000	0	15,907,000	15,913,000	240,000
5	8/11/06	Thalang	47	22,109,000	8,533,000	2,019,000	18,000	40,679,000	8	10,900,000	130,000	62,000,000	74,161,000	6,588,000
6	2/11/06	Nakai Neua	28	53,000	2,695,000	840,000		7,788,000	0	0	0	0	21,988,000	0
7	4/11/06	Nakai Tai	14	67,000	505,000	110,000	6,000	889,000	1	800,000	0	3,904,000	3,993,000	0
8	17/11/06	Phonphan pek	29	80,000	390,000	305,000	3,000	778,000	1	400,000	0	9,400,000	9,775,000	0

# **Social Activities**

## **Downstream Areas**

## **2.4 Downstream Areas Development Plans**

- Work continued to develop livelihood restoration activities, including development of village organizations, village revolving and savings funds, and demonstration farms within the selected pilot villages.
- Work continued to finalize employment contracts for additional staff, as noted in previous monthly progress reports. Most of the new staff members will commence work during January 2007.
- Household fish catch monitoring continued in the 39 selected villages (195 participating households) downstream of Nakai Dam and downstream of the power station during the month of December.
- Activity continue to enter fish catch monitoring data into the fish catch monitoring database

The following tables summarize Downstream Program activities in the 21 pilot villages.

## Village Fund and Saving Report December 2006

No.	Village Name	Number of HH 2006	Account Name	NTPC Compensation Fund				Village Saving Fund				Total Amount Loans Disbursed this month (Kip)
				Funds Transferred to VDCC Bank Account (Kip)	Withdrawal VDCC Fund (Kip)	Deposit by VDCC (Kip)	Balance (Kip)	Members Saving this month (HH)	Opening Balance (Kip)	Total Deposited this month (Kip)	Balance Deposit	
	<b>Gnommalath District</b>	<b>271</b>		542,000,000	45,100,000	-	496,900,000	<b>144</b>	<b>15,003,000</b>	<b>2,935,000</b>	<b>17,938,000</b>	<b>52,800,000</b>
1	Phathung	75	BAN PHATHUNG VDCC NTPC	150,000,001	23,800,000		126,200,001	58	6,116,000	1,965,000	8,081,000	28,300,000
2	Nongping	115	NONGPING VDCC NTPC	229,999,999	15,300,000		214,699,999	32	5,953,000	525,000	6,478,000	16,200,000
3	Khoksavang	81	BAN KHOKSAVANG VDCC NTPC	162,000,000	6,000,000		156,000,000	54	2,934,000	445,000	3,379,000	8,300,000
	<b>Mahaxay District</b>	<b>479</b>		967,653,618	447,374,500	17,000,000	537,279,118	<b>284</b>	<b>101,625,400</b>	<b>8,795,000</b>	<b>110,420,400</b>	<b>160,197,500</b>
4	Mahaxaitai	185	MAHAXAI TAI VDCC NTPC	231,325,441	140,887,500	17,000,000	107,437,941	90	31,890,400	3,155,000	35,045,400	
5	Povaneua	88	POVANEUA VDCC NTPC	220,075,519	115,535,000		104,540,519	83	17,356,000	1,645,000	19,001,000	55,135,000
6	Povatai	111	POVATAY VDCC NTPC	278,485,338	150,952,000		127,533,338	55	49,404,000	2,730,000	52,134,000	101,012,500
7	Khamfeuang	95	KHAMFEUANG VDCC NTPC	237,767,320	40,000,000		197,767,320	56	2,975,000	1,265,000	4,240,000	4,050,000
	<b>Xebangfai District</b>	<b>671</b>		1,336,588,029	488,585,000	-	848,003,029	<b>276</b>	<b>62,569,000</b>	<b>9,556,000</b>	<b>72,125,000</b>	<b>336,152,000</b>
8	Kengpe	89	KENG PE VDCC NTPC	178,035,291			178,035,291		1,910,000	536,000	2,446,000	1,100,000
9	Veunsananh	72	VEUNSANANH VDCC NTPC	144,379,350	70,000,000		74,379,350		2,348,000	150,000	2,498,000	900,000
10	Hatpek	33	HATPEK VDCC NTPC	65,999,984	-		65,999,984		325,000	415,000	740,000	
11	Yangkham	244	YANGKHAM VDCC NTPC	484,947,196	198,585,000		286,362,196	174	27,991,000	6,210,000	34,201,000	176,852,000
12	Hatkhamhieng	233	HATKHAMHIENG VDCC NTPC	463,226,208	220,000,000		243,226,208	102	29,995,000	2,245,000	32,240,000	157,300,000
	<b>Nongbok District</b>	<b>224</b>		490,883,928	267,000,000	-	223,883,928	<b>170</b>	<b>37,833,500</b>	<b>5,764,000</b>	<b>43,597,500</b>	<b>222,900,000</b>
13	Hatxaifong	70	HATXAIFONG VDCC NTPC	104,999,974	74,500,000		30,499,974	49	2,677,000	910,000	3,587,000	74,650,000
14	Navangneua	154	NAVANGNEUA VDCC NTPC	385,883,954	192,500,000		193,383,954	121	35,156,500	4,854,000	40,010,500	148,250,000
	<b>Xaybully District</b>	<b>803</b>		1,061,365,164	430,241,000	97,430,000	728,554,164	<b>372</b>	<b>59,030,500</b>	<b>9,306,000</b>	<b>68,336,500</b>	<b>210,184,317</b>
15	Veunsivilai	153	VEUNSIVILAI VDCC NTPC	227,862,395	96,500,000		131,362,395	91	13,035,000	1,245,000	14,280,000	104,247,500
16	Beungxe	123	BEUNGXE VDCC NTPC	215,799,326	127,038,000	97,430,000	186,191,326	64	25,155,000	3,476,000	28,631,000	4,000,000
17	Beungbouathong	132	BEUGBOUATHONG VDCC NTPC	131,999,967	25,000,000		106,999,967	84	9,797,000	1,512,000	11,309,000	5,088,000
18	Nasang	196	NASANG VDCC NTPC	195,999,951	57,000,000		138,999,951	42	3,950,000	1,370,000	5,320,000	59,348,543
19	Thaphoxai	109	THAPHOXAI VDCC NTPC	108,999,973			108,999,973	58	4,198,500	932,000	5,130,500	1,064,000
20	Nonenakhham	90	NONENAKHAM VDCC NTPC	89,999,978	34,000,000		55,999,978	33	2,895,000	771,000	3,666,000	36,436,274
		<b>2,448</b>		4,398,490,739	1,678,300,500	114,430,000	2,834,620,239	<b>1,246</b>	<b>276,061,400</b>	<b>36,356,000</b>	<b>312,417,400</b>	<b>982,233,817</b>

No.	Village Name	Establishment of Village Development Coordination Committee (VCCCC), Village Auditing Committee (VAC), and Advisory Village Committee (AVC)	Establishment of Saving Fund	Number of Participants of Training in Fund Management and Formulation of Business Plans		Number of Participants Joining Studytour	Number of Participants Attending Quarterly Planning	Land Clearing/ Preparation Wet Season Rice		Number of HH Growing Dry Season Crops 2005/ 06/07	Number of HH Growing Fish	Number of HH Raising Pigs	Number of HH Growing Wet Season Rice, 2006	Number of HH Growing Wet Season Crops, 2006	Number of HH Introducing Mak Gnao ( <i>Jatropha curcas</i> ) for Biodiesel Production
				Project Management	Saving Fund			Number of HH	Surface Area in Rai						
1	Phathoung	+	+	10	10	1	10				3				
2	Nongping	+	+	10	10	1	10								
3	Khoksavang	+	+	10	10	1	10				5				
4	Mahaxaitai	+	+	10	10	1	10			45	6	7			
5	Povaneua	+	+	10	10	1	10			33	4	19	4		3
6	Povatai	+	+	10	10	1	10			57	3	17			
7	Khamfeuung	+	+	10	10		10				5				
8	Kengpe	+	+	10	10		10								14
9	Veunsananh	+	+	10	10		10	32	64						3
10	Hatpek	+	+	10	10		10								10
12	Yangkham	+	+	10	10	2	12			104			6		
13	Hatkhamhieng	+	+	10	10	2	12			75		22			8
14	Hatxaifong	+	+	10	10	1	10			61					
15	Navangneua	+	+	10	10	2	12			91	6	4	20		
16	Veunsivilai	+	+	10	10	2	10			63					
17	Beungxe	+	+	10	10	37	12			41	17	14	45	16	8
18	Beungbouathong	+	+	10	10	2	10			13		12			24
19	Nasang	+	+	10	10		10			57					15
20	Thaphoxai	+	+	10	10		10								39
21	Nonenakham	+	+	10	10		10			34					
		21	21	200	200	54	208	32	64	674	49	95	75	16	124



## **Environmental Activities**

### **3 Environmental activities**

#### **3.1 General**

In addition to the monitoring of the HC's construction activities reported in the Construction section of the report, Camp Followers water quality monitoring reported in section 2.1.3, and the PCR activities reported in section 2.1.1, activities and involvement of the Environmental Management Office in December 06 have included the following:

- Water Quality sampling (5-10 December 2006) and analysis.
- Ongoing Interim Human Elephant Conflict (HEC) Monitoring and continued contractual activities for Elephant Program Phase II.
- Review and revision of the Inception Report for the Wildlife Management and Monitoring Program.
- Ongoing contractual activities for the environmental education component of the Transitional Strategy.
- Review of, the 2<sup>nd</sup> Quarterly Progress Report from the EMU.

#### **3.2 Wildlife Programs**

The description of the various elements of the wildlife program is included for reference.

##### **3.2.1 Fish Impacts in upstream and downstream river species**

The baseline fish/aquatic species and habitat inventory report was finalized in September.

No special remarks for this reporting period.

##### **3.2.2 Wildlife Management and Monitoring Programme**

Given overlaps in baseline survey and management activities, the Terrestrial and Wetland Programs, which are presented separately in the CA, have been combined into one Wildlife Management and Monitoring Program.

The program will be conducted in two phases:

1. Phase I includes (i) the pre-impoundment species and habitat inventories, (ii) development of a post-impoundment species management program, and
2. Phase II includes training the appropriate GOL agency to implement the management plan.

Activities for Phase 1 commenced on 30 September 2006 and the baseline survey and wildlife management plan are schedule to be submitted on 31 July 2007.

Activities during December 2006 include:

- NTPC review and consultant's revision of the Inception Report.

##### **3.2.3 Asian Elephant Program**

1. Pre-impoundment inventory and survey of habitats, distribution, movements.
2. Implementation of a pre-Reservoir impoundment elephant management program.
3. Post-Reservoir impoundment monitoring of movements and distribution.
4. Training of local authorities in conflict response and emergency response.
5. Establishment and implementation of an elephant conflict response team.
6. Development of a transitional strategy for reservoir impoundment.
7. Implementation of a reservoir impoundment elephant strategy.
8. Implementation of post impoundment elephant program.

Phase I of the Elephant Program was conducted by Wildlife Conservation Society (WCS) and includes items 1, 4 and 5 above. The draft Final Report for Phase I was submitted on 31 May 2006. A population of 142 (95% CI=97,207) individuals has been estimated based on the line

transect and dung decay data. Given delays in the DNA analysis, the Final Report will not be finalized until January 2007.

WCS is the likely consultant to conduct Phase II. Objectives of Phase II include development and implementation of a pre- and post-inundation elephant management plan. Management activities will include the continuation of HEC monitoring and training villagers in passive and active crop protection measures.

Activities during December 2006 include:

- Ongoing contractual activities for Phase II.
- Between the end of Phase I and commencement of Phase II, HEC monitoring is continuing to assess the spatial and temporal distribution of HEC on the Nakai Plateau and surrounding areas. HEC incidents were recorded and tabulated below. Similarly to the previous year there has been a sharp increase in the number of HEC in the period following the wet season when crops are ripening.

Month	HEC Incidents
Jul 06	3
Aug 06	10
Sep 06	18
Oct 06	6
Nov 06	51
Dec 06	9

### 3.2.4 Transitional Strategy for Reservoir Impoundment

This program includes the following activities:

1. Development of a transitional strategy for reservoir impoundment.
2. Training of local authorities in wildlife emergency response.
3. Establishment and implementation of an emergency response team.
4. Public awareness program.
5. Prevention and prohibition of wildlife trade.

The requirement to provide recommendations on the transitional strategy has been included in the Wildlife Management and Monitoring Program.

Activities during December 2006 include:

- The Wildlife Management and Monitoring Program Inception Report provides initial recommendations on the extent of activities required for the animal rescue activities. The consultant has proposed a person to develop the wildlife rescue plan, with planning activities scheduled to commence in April 2007. NTPC has requested activities to commence earlier.
- To instill environmental awareness in the Nakai Plateau population, including Resettlers, and reduce the exploitative approaches to wildlife, especially during the transitional phase when animals may be more vulnerable, an environmental education program will be implemented. The education program will be developed by NTPC with GOL participating in the education. Activities to identify and contract a consultant to conduct the environmental education awareness program are still ongoing.

Consistent with the CA, the EMU has identified in its Environmental Management Manual the need for GOL to be responsible for control and enforcement of wildlife protection and prevention of wildlife trade. EMU activities will include (i) assessment of the capacity of GOL enforcement agencies; (ii) assistance to GOL with capacity building; (iii) spot checks to confirm effectiveness of GOL enforcement programs; and (iv) identification of additional measures to improve hunting control (e.g. village level regulations).

### 3.2.5 Adaptive Management Programs

An Adaptive Management approach will be implemented for the following Programs:

1. Wildlife Program (all components)
2. Riparian release downstream of the Nakai Dam
3. Water release in the Nam Kathang
4. Water release from the regulating pond to the downstream channel

No special remarks for this reporting period.

### 3.3 Water Quality Monitoring and Assessment Program

#### **December 2006**

During December 2006, the WQMAP included the following monitoring:

- 27 parameters at 16<sup>1</sup> Surface Water sampling sites. These are located upstream and downstream of construction areas on the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit, and Xe Bangfai. Given the potential for Project increases in sediment load, the spatial distribution of turbidity was monitored at 7 surface water sites and at 6 construction site discharges along the Nam Kathang.
- 12 physiochemical parameters at 15 Resettlers and Project Lands Groundwater sampling site. 1 bacteriological parameter at 30 Resettlers and Project Lands Groundwater sampling sites. These are new groundwater installations located on the Nakai Plateau that have been provided by NTPC.

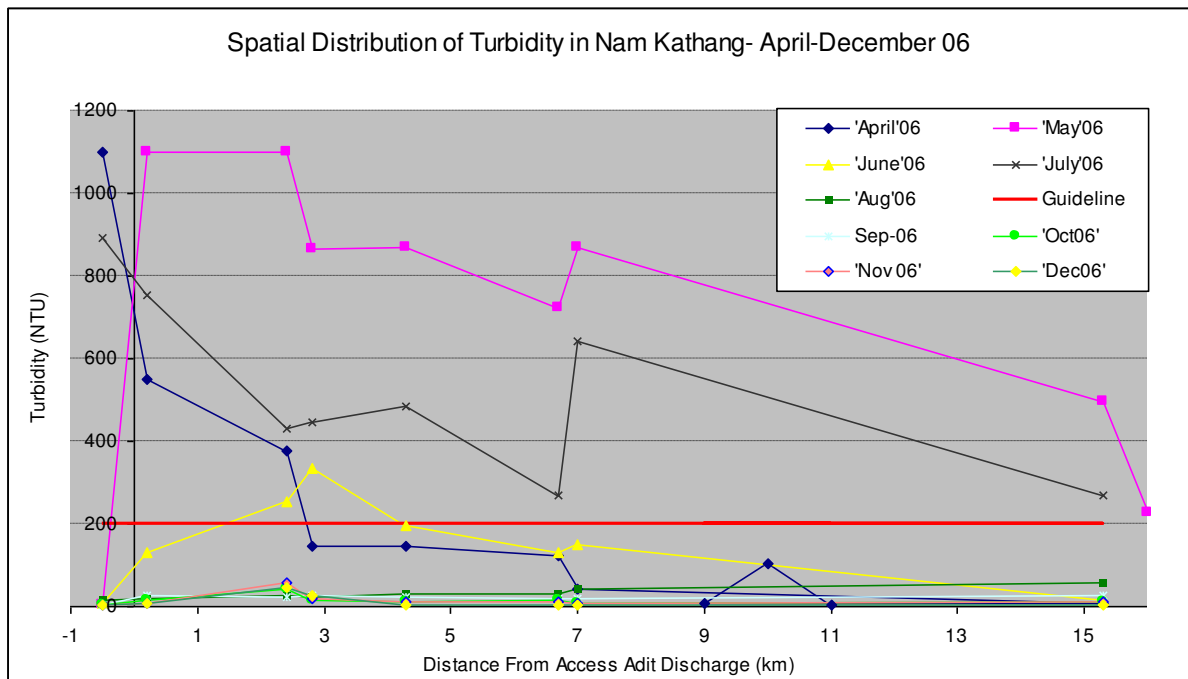
#### **Field Observations - December 2006**

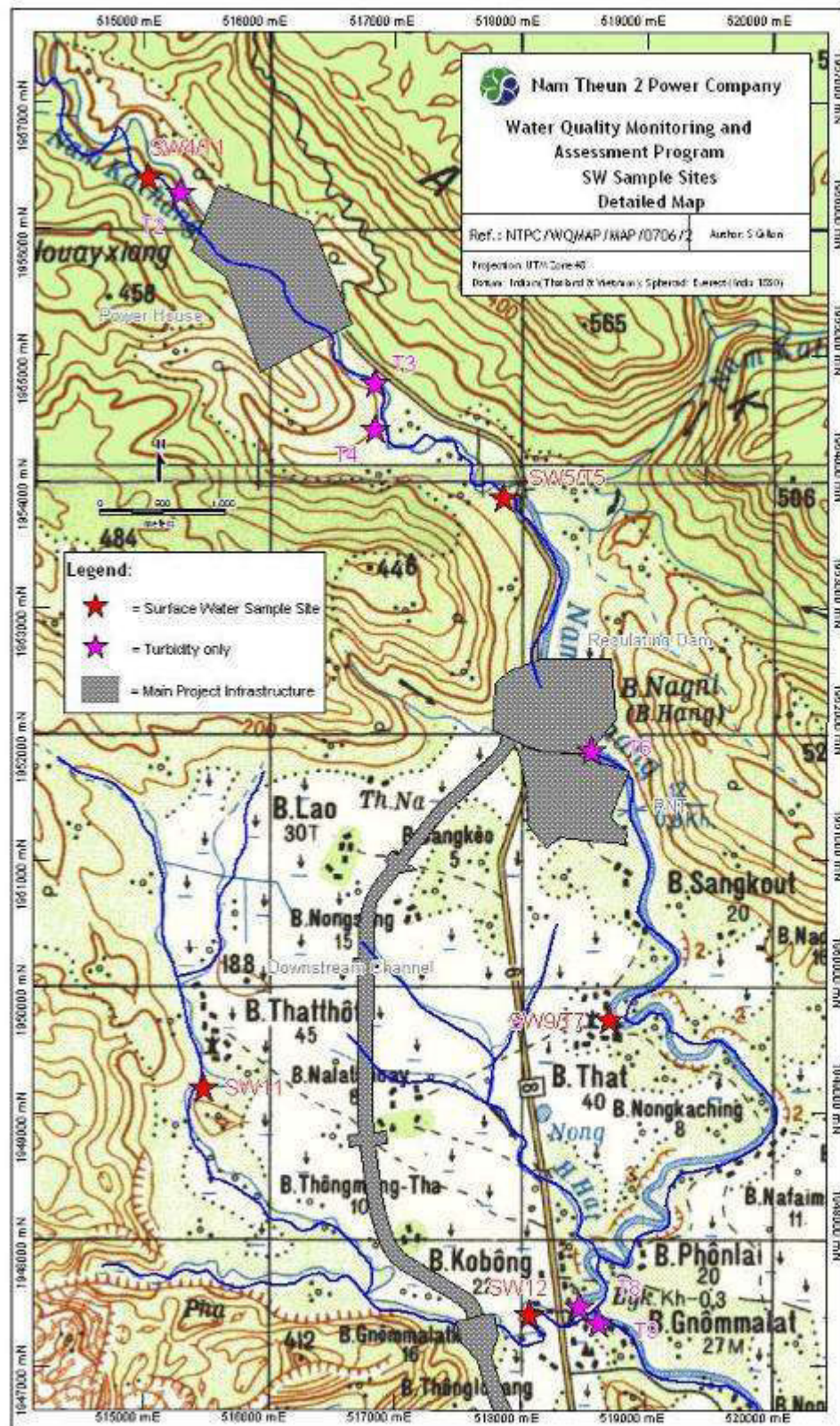
Sample collection and field analyses were conducted during 5-10 December 2006. The major field observations and measurements are as follows:

- The turbidity in the Nam Kathang continues to remain within the Project Guideline which reflects the reduction in rainfall and surface runoff from cleared construction areas during the dry season. Improvements in sedimentation controls at the Access Adit and Power House have contributed to the improved water quality in the Nam Kathang.
- Turbidity levels are within the Project guideline for the entire length of the upper Nam Kathang from upstream of the Power House to Ban Gnommalat.
- There was no discharge from the Access Adit Platform 415 sedimentation basins during sampling.
- Discharge from the Power House was 49.1 NTU.
- During the sampling event there were no discharges down the Nakai escarpment from the Saddle Dam 12b, Headrace Channel or Intake Structure construction areas.

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<sup>1</sup> SW13 is located on a seasonal water body and therefore monitoring only in wet season. SW10 is located on the Nam Pan which is no longer included in the WQMAP.





### Turbidity Sampling sites

## December 2006 Water Quality Results

The laboratory analytical results for December 2006 are presented in the tables below. As a screening procedure, the results have been compared with Project guidelines. Values highlighted in yellow represent exceedences. Comparison of measured values with guidelines is intended as an initial screening step to assist in data interpretation. Exceedences are then considered on a site-

specific basis to assess whether a measured value poses an environmental or human health risk. The significant project-related exceedences are discussed below.

### **Surface Water – December 2006**

#### **Nam Theun**

- The water quality in the Nam Theun continues to be considered as good with no significant exceedences of the Project Guidelines.

#### **Nam Kathang**

- The water quality in the Nam Kathang can be considered as good with few significant exceedences of the Project Guidelines.
- Turbidity and TSS, coupled with nitrogen-nutrients and iron, continue to remain within the Project Guidelines.
- Alkalinity exceeds its Project Guideline downstream of the Power House (SW5) and then again in the lower Nam Kathang (SW14). Groundwater flowing from the water conduits at the Power House may be contributing to the increase in alkalinity at SW5. Given that no construction sites or camps are located on the Nam Kathang between SW9 and SW14, the exceedence of alkalinity in the lower Nam Kathang (SW14) is not deemed to be significant or Project-related. Elevated alkalinity at SW14 is consistent with previous months and is likely a result of alkaline waters of the Nam Gnom entering the Nam Kathang at Ban Gnommalat. There is no health-based drinking water guideline for alkalinity and therefore the measured level is not deemed to pose a risk to human health.
- Coupled with the increase in alkalinity, potassium exceeds its Project Guideline downstream of the Power House (SW5) with a downstream decreasing trend. It is likely that elevated potassium is being sourced from a higher proportion of groundwater in the dry season surface water flow, and mineral solution in groundwater with a mica containing catchment. The groundwater flowing out of the water conduits at the Power House is likely contributing to this. Potassium is usually readily removed from solution by plants and clays. Removal of plants and clay from the banks of the Nam Kathang during Nam Kathang Diversion excavations may be reduce the potassium sink. There is no health-based drinking water guideline for potassium and therefore the measured level is not deemed to pose a risk to human health.
- Silica exceeds its river specific guideline at the upstream control (SW4) and downstream of the Power House (SW5) with a slight downstream decreasing trend. Given that silica exceeds its guideline in the upstream control, the elevated levels are not deemed to be Project-related. There is no health-based drinking water guideline for silica and therefore the measured level is not deemed to pose a risk to human health.

#### **Nam Gnom**

- With the exception of faecal coliform, the water quality in the Nam Gnom continues to be considered as good with few significant exceedences of the Project Guidelines.
- Alkalinity and calcium both exceed their respective Project Guidelines at the upstream control (SW11), and alkalinity exceeds its Project Guideline downstream of the Nam Gnom Siphon (SW12). Given the exceedences at the upstream control (SW11), high calcium and alkalinity level are not deemed to be Project-related. High calcium and alkalinity are likely a result of increase in the proportion of groundwater from the limestone karsts which surround the upper Nam Gnom catchment.
- Coupled with an elevated alkalinity, pH slightly exceeds the upper range of the Project Guideline at the upstream control (SW11) but is not thought to be either significant or Project related.
- Faecal coliform exceeds the Project Guideline at the upstream control site (SW11) and therefore not deemed to be Project-related. The source of this exceedence is likely the poor sanitation infrastructure and livestock of Ban That. Faecal coliform are indicators the bacteria and pathogen load in the water which could pose a risk to human health. Communities should continue with the practice of boiling surface water prior to consumption.

#### **Nam Phit**

- The water quality in the Nam Phit can be considered as good with few exceedences of the Project Guideline. There was no flowing water at the upstream control (SW13) at the time of sampling and therefore no sample collection or analysis was performed.
- Calcium exceeds its Project Guideline at the downstream site (SW6). The source is likely to be increased groundwater inputs from the limestone karsts which surround the Nam Phit



catchment rather than Project-related. Although the exposure of limestone outcrops during the excavation of the Downstream Channel may be contributing to the elevation. There is no health-based WHO drinking water guideline for calcium and therefore the measured level is not deemed to be significant.

### **Xe Bangfai**

- The water quality of the Xe Bangfai can be considered as good with few significant exceedences of the Project guideline.
- Consistent with other lowland rivers being monitored, pH, alkalinity and calcium exceed their respective Project Guidelines at several points along the Xe Bangfai. As discussed above, these increases are likely a result of an increase in the proportion of groundwater inputs from limestone karst dominated catchments rather than Project-related. None of the measured values are considered to pose a risk to environmental or human health.

## **Groundwater**

### **Community Groundwater – December 2006**

No special remarks for this reporting period.

### **Resettlers & Project Lands Groundwater – December 2006**

The Resettler's and Project Lands Groundwater monitoring is determining whether groundwater installations provided by NTPC are of an acceptable quality, and also establishing a pre-operations baseline for groundwater.

Analytical results for Resettler's & Project Lands Groundwater are presented in below. Although most of the parameters are within the Lao standard for rural drinking water, pH, turbidity, and faecal coliform values exceed the Lao standard in some instances. The implications of these exceedences are summarized below:

- pH exceeds the Lao standard at numerous groundwater sampling sites. The observed values are consistent with dissolved carbon dioxide resulting from precipitation and sub-surface run-off infiltrating through the soil and the presence of naturally occurring humic and fulvic acids. Although the WHO suggests that a pH less than 6.5 would markedly impair the potability of the water, there is no health-based WHO guideline for pH. However, extreme pH values (greater than 11 or less than 4) can cause irritation of the eyes, skin and mucous membranes, and less often gastrointestinal irritation. No adverse human health effects are likely to result of the moderately acidic values measured at the stations sampled.
- Turbidity exceeds the Lao standard at GW9. This elevation may have resulted from carryover slurry during the drilling process. The level is only slightly above the Lao standard and not thought to be significant. The human health implications of elevated turbidity are discussed above.
- During the November 2006 sampling event fecal coliform was identified at several Resettler's Groundwater sampling sites. The contamination may have resulted from contamination during drilling or the well equipment not being sterilized adequately after well installation. Another source of contamination is people touching the well aperture during washing or food preparation (such as gutting pigs, chickens) activities which have been observed during sampling. A compromised integrity of the pump head skirt could not be ruled out.

In response to the identification of fecal coliform contamination, to help to distinguish the potential sources, during the December 2006 sampling the aperture of all hand pumps was sterilized with 90% ethanol prior to sampling. In addition, for those groundwater sites which tested positive in November 2006, pre- and post-sterilization samples were taken.

Post sterilization faecal coliforms levels exceed the Lao standard at RGW12 and RGW21. For these sampling sites it appears that the source of the contamination is from within the groundwater installation.

For RGW1, 6, 20 & 14, there was fecal coliform contamination in the pre-sterilization sample but no fecal coliform contamination in the post-sterilization sample. The source of the contamination appears to be from the hand pump casing.



**Table:** December 2006 Surface Water Quality in the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit and Xe Bangfai.

Parameter	Unit	WQ Guidelines	River-Specific Guideline	Nam Theun			
				SW 1	SW 2	SW3	SW 18
Sampling Date				9/12/2006	9/12/2006	8/12/1949	8/12/2006
Sampling Time				11.15 h	9.15 h	12.14 h	11.55 h
Water Depth	(m)			1.2	2.8	5.6	2.7
Sampling Method				grab	grab	grab	grab
Air Temperature	(°C)			23.6	21.8	39	34.5
Cloud Coverage				40	5	60	40
Water Temperature	(°C)			23.1	22.4	24.3	24.4
pH		6.0-8.0		6.73	6.68	6.72	6.79
DO	(mg/L)	> 5.0		9.53	9.43	8.07	8.12
% DO Saturation	(%)			116.4	113.4	100.8	102.2
Conductivity	(µS/cm)	< 350 or <750 *		51	44	49	49
Turbidity	(NTU)	< 200		4.92	4.75	3.73	3.68
Total suspended solids	(mg/L)	< 40 or <80*		2.7	4.9	1.2	1.1
Alkalinity	(mg/L)	- <sup>11</sup>	36.4	20.8	20.8	21.6	20.4
Ammonia-nitrogen	(mg/L)	< 0.5		0.088	0.156	0.092	0.106
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	< 3.4		0.159	0.088	0.079	0.072
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)	< 0.2		0.007	0.007	ND <sup>2</sup>	0.007
Kjeldahl nitrogen(TKN)	(mg/L)	- <sup>11</sup>	1.030	ND <sup>3</sup>	0.334	ND <sup>3</sup>	ND <sup>3</sup>
Potassium (K)	(mg/L)	- <sup>11</sup>	1.06	0.68	0.73	0.723	0.709
Sodium (Na)	(mg/L)	300		2.76	2.58	2.88	2.9
Manganese (Mn)	(mg/L)	< 0.5		0.02	0.018	0.03	0.032
Total iron (Fe)	(mg/L)	< 1.0		0.388	0.456	0.375	0.35
Lead (Pb)	(mg/L)	< 0.05		ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>
Calcium (Ca )	(mg/L)	50		3.31	3.06	3.21	3.56
Magnesium (Mg)	(mg/L)	< 15		0.9	0.9	0.9	0.95
Silica (SiO <sub>2</sub> )	(mg/L)	- <sup>11</sup>	10.3	9.71	9.39	9.75	9.71
Sulphate (SO <sub>4</sub> <sup>-2</sup> )	(mg/L)	< 500		2.46	1.6	1.02	ND <sup>6</sup>
Chloride (Cl <sup>-</sup> )	(mg/L)	< 250		3.06	2.4	2.49	2.87
Total mercury (Hg)	(mg/L)	< 0.001		ND <sup>8</sup>	ND <sup>8</sup>	ND <sup>8</sup>	ND <sup>8</sup>
Arsenic (As)	(mg/L)	< 0.05		0.0006	0.0016	ND <sup>9</sup>	ND <sup>9</sup>
BOD	(mg/L)	< 15		ND <sup>10</sup>	ND <sup>10</sup>	ND <sup>10</sup>	ND <sup>10</sup>
COD	(mg/L)	< 40		3.22	14.5	6.44	3.22
Total phosphorus	(mg/L)	< 0.2		0.01	ND <sup>11</sup>	ND <sup>11</sup>	0.01
Faecal Coliform	(C/100mL)	150		53	62	4	8

\* 350 µS/cm for Nam Theun; 750 µS/cm for lowlands rivers

\* 40 mg/L for all rivers in all seasons with the exception of 80 mg/L for the Xe Bangfai in wet season

**Table:** December 2006 Surface Water Quality in the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit and Xe Bangfai.

Parameter	Unit	WQ Guidelines	River-Specific Guideline	Nam Kathang					Nam Gnom	
				SW 4	SW5	SW 9	SW 14	SW15	SW 11	SW 12
Sampling Date				6/12/2006	6/12/2006	6/12/2006	5/12/2006	6/12/2006	6/12/2006	6/12/2006
Sampling Time				09.22 h	10.34 h	11.55 h	11.21 h	10.10 h	11.15 h	12.35 h
Water Depth	(m)			0.2	0.4	0.3	0.5	0.9	1	1.1
Sampling Method				grab	grab	grab	grab	grab	grab	grab
Air Temperature	(°C)			26	28.2	31.2	28.5	30	-	33.6
Cloud Coverage				95	98	100	5	100	100	100
Water Temperature	(°C)			24	22.4	25.9	25.1	22.2	25.3	25.1
pH		6.0-8.0		6.97	7.59	7.76	7.84	7.15	8.03	7.26
DO	(mg/L)	> 5.0		9.01	9.42	8.71	10.66	8.74	10.15	10.44
% DO Saturation	(%)			105.1	113.6	107.9	129.4	101.5	101.8	128.2
Conductivity	(µS/cm)	< 350 or <750 *		313	452	267	317	139	334	312
Turbidity	(NTU)	< 200		2.3	3.49	5.76	3.65	4.16	4.54	7.77
Total suspended solids	(mg/L)	< 40 or <80*		ND <sup>1</sup>	1.4	5	0.6	1.8	2.4	4.3
Alkalinity	(mg/L)	- <sup>11</sup>	133.8	115	146	98.6	168	68.6	174	168
Ammonia-nitrogen	(mg/L)	< 0.5		0.082	0.116	0.068	0.04	0.075	0.092	0.15
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	< 3.4		0.017	0.025	0.025	0.088	0.04	0.34	0.238
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)	< 0.2		0.007	0.007	0.007	0.007	0.007	ND <sup>1</sup>	0.007
Kjeldahl nitrogen(TKN)	(mg/L)	- <sup>11</sup>	1.089	ND <sup>3</sup>	ND <sup>3</sup>	0.223	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Potassium (K)	(mg/L)	- <sup>11</sup>	1.56	0.453	1.86	1.69	0.543	0.771	0.312	0.376
Sodium (Na)	(mg/L)	300		10.6	31.8	15.9	3.33	4.7	0.95	1.05
Manganese (Mn)	(mg/L)	< 0.5		ND <sup>4</sup>	0.04	0.045	0.029	0.015	ND <sup>3</sup>	0.024
Total iron (Fe)	(mg/L)	< 1.0		0.02	0.082	0.254	0.13	0.149	0.087	0.186
Lead (Pb)	(mg/L)	< 0.05		ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>5</sup>	ND <sup>4</sup>	ND <sup>4</sup>
Calcium (Ca )	(mg/L)	50		34.6	42.8	25.5	48.8	17.5	52.9	17.5
Magnesium (Mg)	(mg/L)	< 15		6.48	7.53	4.13	2.28	1.53	2.18	1.53
Silica (SiO <sub>2</sub> )	(mg/L)	- <sup>11</sup>	16.2	16.8	20.1	13.3	8.81	3.77	7.3	7.54
Sulphate (SO <sub>4</sub> <sup>-2</sup> )	(mg/L)	< 500		55.2	89.5	28.2	3.04	1.69	ND <sup>5</sup>	1.12
Chloride (Cl <sup>-</sup> )	(mg/L)	< 250		ND <sup>7</sup>	10.6	11.9	2.53	4.79	2.4	0.28
Total mercury (Hg)	(mg/L)	< 0.001		ND <sup>8</sup>	ND <sup>8</sup>	ND <sup>8</sup>	ND <sup>8</sup>	ND <sup>8</sup>	ND <sup>6</sup>	ND <sup>6</sup>
Arsenic (As)	(mg/L)	< 0.05		ND <sup>9</sup>	ND <sup>9</sup>	ND <sup>9</sup>	ND <sup>9</sup>	ND <sup>9</sup>	ND <sup>7</sup>	ND <sup>7</sup>
BOD	(mg/L)	< 15		ND <sup>10</sup>	0.5	0.7	0.6	ND <sup>10</sup>	ND <sup>8</sup>	ND <sup>8</sup>
COD	(mg/L)	< 40		24.4	29.4	32.6	27.8	19.6	21.2	16.3
Total phosphorus	(mg/L)	< 0.2		ND <sup>11</sup>	0.01	0.02	0.013	0.013	0.01	0.01
Faecal Coliform	(C/100mL)	150		37	112	139	79	131	158	68

\* 350 µS/cm for Nam Theun; 750 µS/cm for lowlands rivers

\* 40 mg/L for all rivers in all seasons with the exception of 80 mg/L for the Xe Bangfai in wet season

**Table:** December 2006 Surface Water Quality in the Nam Theun, Nam Kathang, Nam Gnom, Nam Phit and Xe Bangfai.

Parameter	Unit	WQ Guidelines	River- Specific Guideline	Nam Phit
				SW 6
Sampling Date				5/12/1949
Sampling Time				12.16 h
Water Depth	(m)			0.6
Sampling Method				grab
Air Temperature	(°C)			32
Cloud coverage				80
Water Temperature	(°C)			26.3
pH		6.0-8.0		7.21
DO	(mg/L)	> 5.0		5.09
% DO Saturation	(%)			62.3
Conductivity	(µS/cm)	< 350 or <750 *		424
Turbidity	(NTU)	< 200		6.64
Total suspended solids	(mg/L)	< 40 or <80*		6.9
Alkalinity	(mg/L)	- <sup>11</sup>	252.6	234
Ammonia-nitrogen (NH <sub>3</sub> -N)	(mg/L)	< 0.5		0.08
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	< 3.4		0.332
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)	< 0.2		ND <sup>1</sup>
Kjeldahl nitrogen(TKN)	(mg/L)	- <sup>11</sup>	0.688	ND <sup>2</sup>
Potassium (K)	(mg/L)	- <sup>11</sup>	0.19	0.173
Sodium (Na)	(mg/L)	300		0.45
Manganese (Mn)	(mg/L)	< 0.5		0.026
Total iron (Fe)	(mg/L)	< 1.0		0.262
Lead (Pb)	(mg/L)	< 0.05		ND <sup>4</sup>
Calcium (Ca )	(mg/L)	50		61.3
Magnesium (Mg)	(mg/L)	< 15		6.03
Silica (SiO <sub>2</sub> )	(mg/L)	- <sup>11</sup>	8.8	8.57
Sulphate (SO <sub>4</sub> - <sup>2</sup> )	(mg/L)	< 500		1.88
Chloride (Cl-)	(mg/L)	< 250		0.58
Total mercury (Hg)	(mg/L)	< 0.001		ND <sup>6</sup>
Arsenic (As)	(mg/L)	< 0.05		ND <sup>7</sup>
BOD	(mg/L)	< 15		ND <sup>8</sup>
COD	(mg/L)	< 40		13.1
Total phosphorus	(mg/L)	< 0.2		0.027
Faecal Coliform	(C/100mL)	150		23

River- Specific Guideline	Xe Bangfai			
	SW7	SW8	SW16	SW 17
	5/12/2006	5/12/2006	7/12/2006	7/12/2006
	10.26 h	13.40 h	11.30 h	13.25 h
	0.7	1.8	2.8	2.6
	grab	grab	grab	grab
	29.8	29.8	28.2	32
	20	80	0	50
	27.3	26.6	25	28.1
	7.96	7.83	7.63	8.07
	8.56	8.39	7.97	7.64
	105.8	104.3	98.6	99.4
	369	358	368	339
	3.55	3.24	3.58	11.8
	2.4	2.4	3.6	11.8
200.6	203	203	205	194
	0.034	0.06	0.094	0.087
	0.111	0.104	0.096	0.08
	0.007	0.007	0.007	0.007
0.559	ND <sup>2</sup>	ND <sup>2</sup>	0.334	0.557
0.68	0.389	0.388	0.37	0.482
	1.7	1.75	1.52	1.57
	ND <sup>3</sup>	ND <sup>3</sup>	0.016	0.025
	0.049	0.088	0.1	0.311
	ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>4</sup>	ND <sup>4</sup>
	45.7	55.4	57.6	53.6
	3.68	4.33	4.8	5.65
10.5	9.47	9.34	9.18	9.14
	1.21	1.21	1.12	1.4
	1.36	0.78	2.01	1.44
	ND <sup>6</sup>	ND <sup>6</sup>	0.0003	0.0002
	ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>7</sup>	ND <sup>7</sup>
	0.5	0.5	1	ND <sup>8</sup>
	34.2	27.8	8.05	6.44
	0.013	0.013	0.01	0.01
	25	9	19	24

\* 350 µS/cm for Nam Theun; 750 µS/cm for lowlands rivers

\* 40 mg/L for all rivers in all seasons with the exception of 80 mg/L for the Xe Bangfai in wet season

**Table:** Analytical Results of Resettlers Groundwater Monitoring

Parameter	Unit	Lao Standard <sup>1</sup>	RGW1	RGW2	RGW3	RGW4	RGW5	RGW6	RGW7	RGW8
Sampling Date			06/12/06	05/12/06	07/12/06	09/12/06	10/12/06	10/12/06	10/12/06	10/12/06
Sampling Time			8.38 h	8.55 h	8.30 h	12.08 h	10.24 h	10.56 h	11.11 h	11.30 h
Water Depth	(m)		-	-	-	-	-	-	-	-
Sampling Method			grab	grab	grab	grab	grab	grab	grab	grab
Air Temperature	(°C)	-	-	-	-	-	-	-	-	-
Water Temperature	(°C)	-	24.3	24.2	25.1	25.4	25.2			
Odor		Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
pH		6.5-8.5	6.28	6.61	6.96	6.47	5.65	5.84	5.78	6.68
DO	(mg/L)	-	2.42	2.08	2.86	3.69	2.94	1.78	2.17	2.08
% DO Saturation	(%)	-	30.8	25.5	36.7	47.7	39.3	22.8	29.3	25.9
Conductivity	(µS/cm)	1000	168	376	411	192	58	77	44	419
Turbidity	(NTU)	<10	1.64	1.67	2.50	1.84	3.94	2.37	1.82	2.91
Total Hardness	(mg/L)	<500	61.6	178	187	80.6	37.9	35.0	26.5	186
Fluoride	(mg/L)	<1.5	0.14	0.24	0.14	0.12	0.10	0.10	0.10	0.16
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	40	1.42	0.134	0.126	0.387	0.466	0.111	0.055	ND <sup>1</sup>
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)		ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>1</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Arsenic (As)	(mg/L)	<0.05	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>3</sup>	0.0006	0.0004
Iron (Fe)	(mg/L)	<1	0.040	0.029	0.017	0.054	0.103	0.160	0.063	0.046
Manganese (Mn)	(mg/L)	<0.5	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	0.042	ND <sup>4</sup>	ND <sup>4</sup>	0.016

<sup>1</sup> taken from Resolution No.895/MOH (14th July 2003)<sup>1,2</sup> Non-detectable (Detection limit = 0.001 mg/L)<sup>3</sup> Non-detectable (Detection limit = 0.0003 mg/L)<sup>4</sup> Non-detectable (Detection limit = 0.016 mg/L)<sup>5</sup> Non-detectable (Detection limit = 0.014 mg/L)

**Table:** Analytical Results of Resettlers Groundwater Monitoring

Parameter	Unit	Lao Standard	RGW9	RGW10	RGW11	RGW12	RGW13	RGW14	RGW15
Sampling Date			05/12/06	10/12/06	10/12/06	10/12/06	10/12/06	10/12/06	10/12/06
Sampling Time			09.09 h	11.51 h	12.46 h	12.20 h	08.27 h	08.41 h	09.40 h
Water Depth	(m)		-	-	-	-	-	-	-
Sampling Method			grab	grab	grab	grab	grab	grab	grab
Air Temperature	(°C)		-	-	-	-	-	-	-
Water Temperature	(°C)	-	24.8	24.1	24.4	25.3	22.8	23.3	23.9
Odor		Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
pH		6.5-8.5	6.79	6.72	6.92	5.98	6.97	5.01	6.65
DO	(mg/L)	-	2.48	1.62	1.94	1.92	2.61	2.24	2.15
% DO Saturation	(%)	-	31.1	20.5	24.8	24.9	31.2	27.8	26.8
Conductivity	(µS/cm)	1000	437	480	561	64	539	17.2	352
Turbidity	(NTU)	<10	22.4	1.62	1.58	1.68	1.49	1.67	1.91
Total Hardness	(mg/L)	<500	165	210	222	22.7	232	3.8	163
Fluoride	(mg/L)	<1.5	0.29	0.15	0.13	0.12	0.16	0.12	0.10
Nitrate-nitrogen(NO <sub>3</sub> -N)	(mg/L)	40	0.040	0.055	ND <sup>1</sup>	0.047	0.055	0.111	0.055
Nitrite-nitrogen(NO <sub>2</sub> -N)	(mg/L)		ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>	ND <sup>2</sup>
Arsenic (As)	(mg/L)	<0.05	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	ND <sup>3</sup>	0.0008
Iron (Fe)	(mg/L)	<1	0.508	0.042	0.032	0.048	0.029	0.142	0.033
Manganese (Mn)	(mg/L)	<0.5	ND <sup>4</sup>	0.052	ND <sup>4</sup>	0.018	ND <sup>4</sup>	0.016	ND <sup>4</sup>

<sup>1</sup> taken from Resolution No.895/MOH (14th July 2003)<sup>1,2</sup> Non-detectable (Detection limit = 0.001 mg/L)<sup>3</sup> Non-detectable (Detection limit = 0.0003 mg/L)<sup>4</sup> Non-detectable (Detection limit = 0.016 mg/L)<sup>5</sup> Non-detectable (Detection limit = 0.014 mg/L)

Table: Faecal Coliform results for the Resettler's &amp; Project Lands Groundwater

Village	Site ID	Dec'06 (FC/100 mL)	
		Pre-sterile	Post-sterile
Oudomsouk	RGW1	2	0
	RGW28		0
School	RGW3	0	0
Oudomsuk Mai	RGW2		0
	RGW9		0
	RGW27		0
Phone-phan-pek	RGW4		0
	RGW29	0	0
Nong Boua	RGW5		0
	RGW30		0
Boua-Ma	RGW6	1	0
	RGW22		0
	RGW23		0
Phonesavang	RGW7		0
	RGW20	2	0
	RGW21		2
Sop-On	RGW8		0
	RGW10		0
	RGW18		0
	RGW19		0
Ban Done	RGW11		0
	RGW12	26	30
	RGW16		0
	RGW17		0
Sop-Phan	RGW13		0
Sop-Hia	RGW14	1	0
	RGW24		0
	RGW25		0
Sop-Ma	RGW15		0
	RGW26	0	0
<b>QA/QC</b>			
Bottle Blanks			0
Field Blanks			0



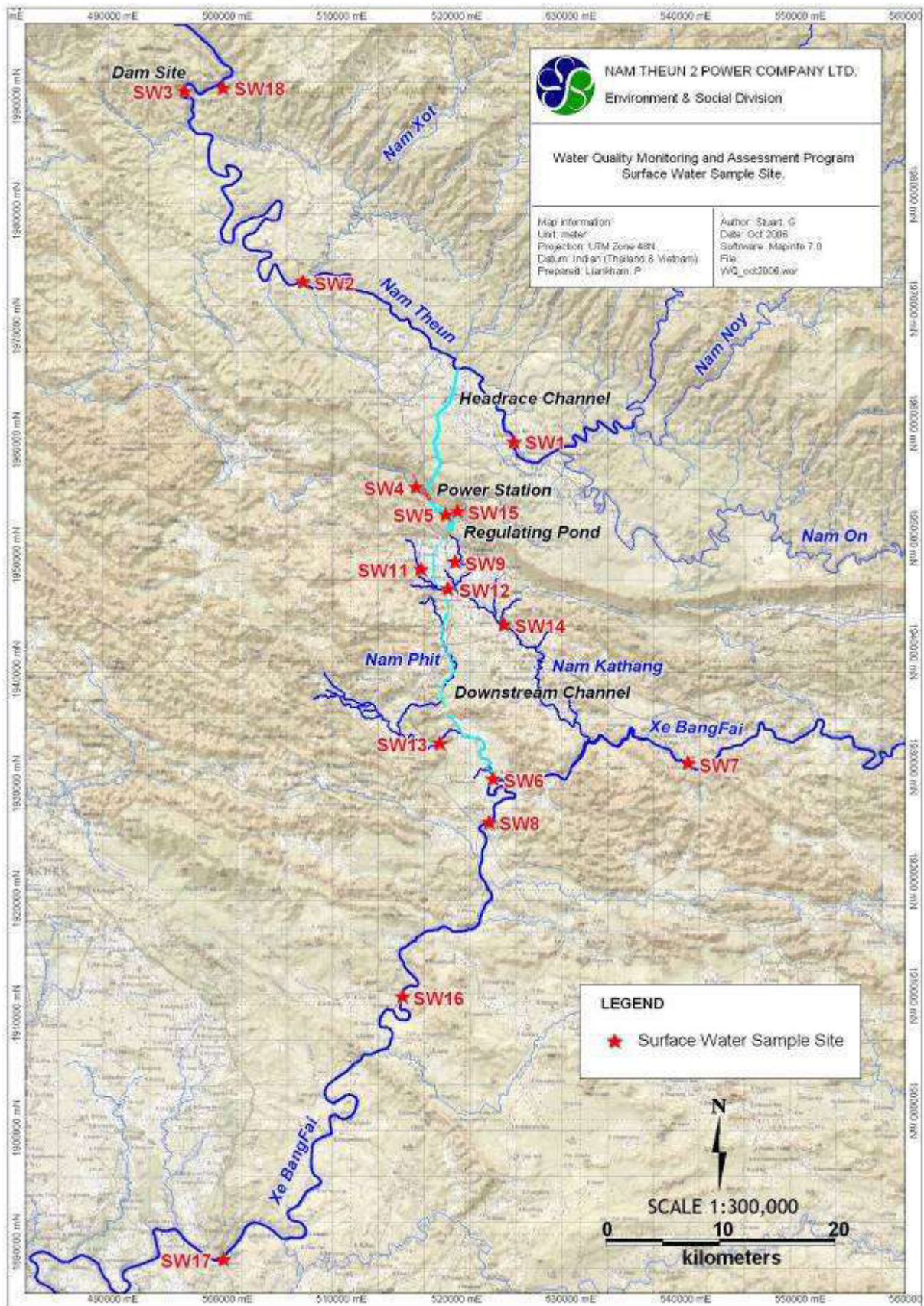
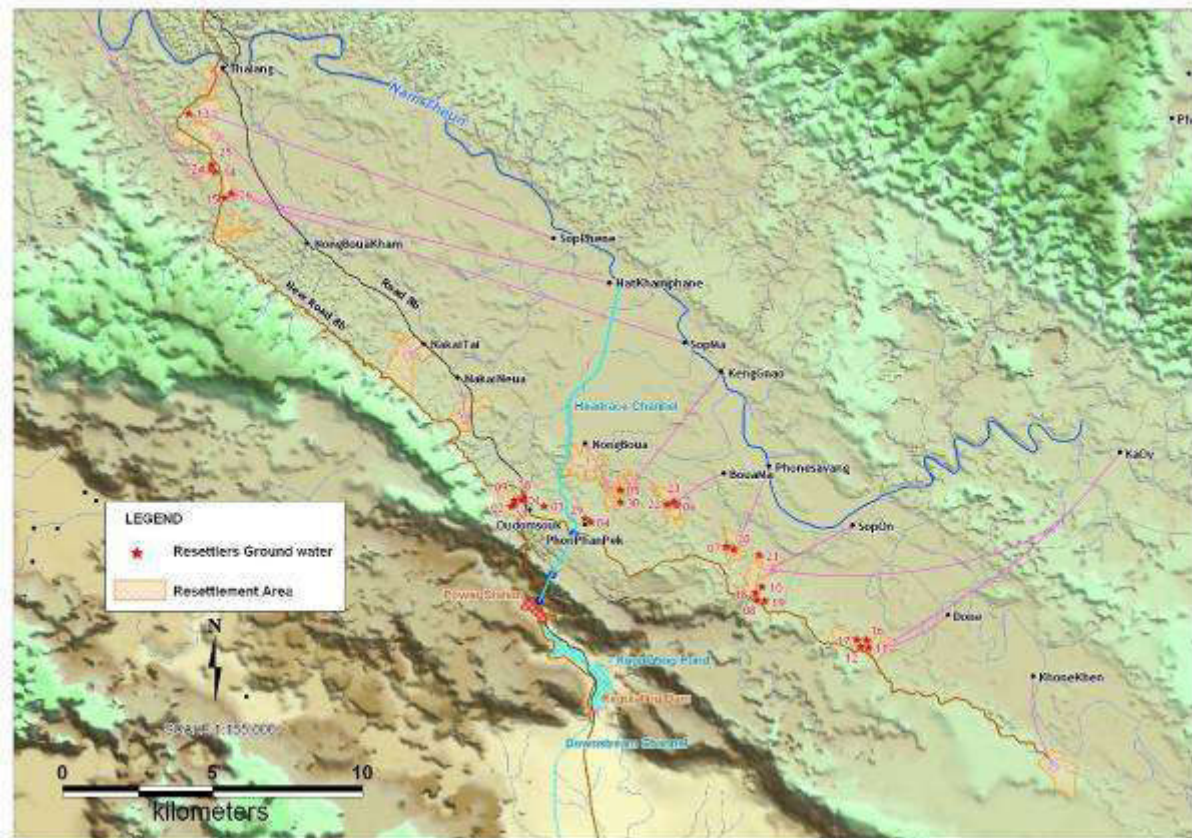




Figure: Resettlers &amp; Project Lands Groundwater sampling sites





### 3.4 Environment Management Unit (EMU) Technical Assistance (TA)

Activities undertaken by the EMU and EMU TA during December 2006 are presented in the Work Plan below<sup>2</sup> and also include:

- Submission of the second Quarterly Progress Report which is under NTPC review.
- EMU personnel continue to accompany EMO Inspectors on joint site inspections, alternating personnel from EMU Khammouane and EMU Bolikhamxay. Details of the construction areas inspected by the EMU are provided in Part B, Section 1.2 (*Environment Protection*) of this Report.

CA Ref No.	EMU Activity (Work Plan)
NA	Translation of the EMU Environmental Monitoring Manual
03	Commence consultation with the SLMU regarding salvage logging operations and measures to maximize biomass removal.
03	Meet with RMU and VFA to discuss roles regarding lesser value biomass removal
07	Consult with the NTPC regarding establishment of adaptive management committee for the Nam Kathang
11	Request information from NTPC regarding the design specifications of the Confluence Area to confirm that appropriate stabilization or protection measures, such as rip-rap, are provided to minimize scouring.
11	Commence infield spot checks of the Confluence Area to confirm consistency of construction activities with design specifications.
13	Conduct infield spot checks of the Downstream Channel construction to confirm provisions for localized low points
18	Consult with WMPA, RMU and district authorities to assess the capacity of the GOL enforcement agencies (technical, human, financial resources) to implement hunting controls in the Resettlement Areas. Assist the GOL enforcement agencies with the development of capacity as required.
19	Consult with the NTPC regarding establishment of adaptive management committee for wildlife program
21	Conduct a GPS survey of the extent of spoil disposal areas in Gnommalat
23	Conduct investigation of vegetation clearance with respect to design standards along new road zones D and F
24	Request the NTPC to provide the results from the PCR field surveys, as well as the recommended mitigation and management measures
25	Request the NTPC to provide a copy of the Health and Safety Program.
26	Request the NTPC to provide a copy of the EIAs for quarry areas.
26	Request the NTPC to report on the progress of quarry activities.
27	Request the NTPC to provide the results of the environmental impact assessment for the final alignment of the Transmission Line
34	Request the NTPC to provide a plan to mitigate noise exceedances as reported in the NTPC Progress Report
36	Review the Landscaping and Revegetation Management Plan (Rev. A)
36	Follow-up request for the NTPC to report on progress of revegetation activities
37	Request the NTPC to report on the implementation of enforcement mechanisms for controlling vehicle speeding
37	Coordinate with GOL to strengthen capacity to enforce speed limits
39	Request the NTPC to report on the implementation of environmental training of construction workforce
41	Request the NTPC to provide copies of the Village Development Plans for resettled villages
41	Clarify roles and responsibilities of the EMU with the RMU with respect to Part A, Part C and Part E
44	Request that NTPC provide a progress report for environmental grievances
44	Assess the feasibility for the EMU to provide capacity building to district staff with respect to grievance management
NA	Review the Salvage Logging Code of Conduct and Technical Guidelines, and the EMP for the Salvage Logging access road to confirm the inclusion of adequate measures to avoid and minimize impacts of pollution

CA Ref No.	EMU Activity (Work Plan)
NA	Prepare monitoring report including observations and non-compliances for submission to the Salvage Logging Committee

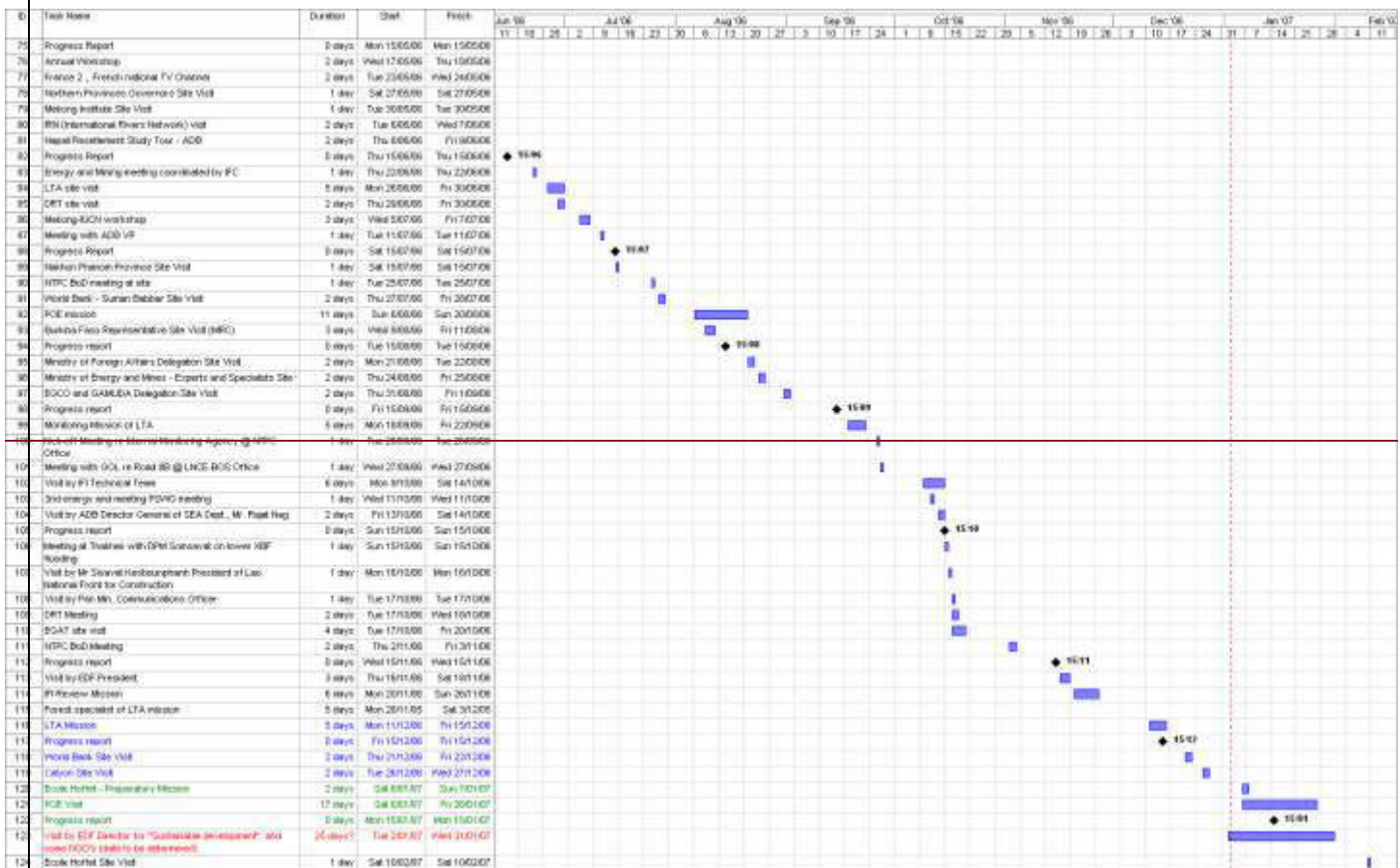
### 3.5 EMO's activities linked to construction

The environmental activities linked to construction works are part of the Construction Progress Report, Part B of this Monthly Progress Report.

## **Internal, External Monitoring**

## 4 Internal and External Monitoring

Schedule of visits since Financial Close: Visits of the month in blue—Next scheduled visit in green.



## **GOL Related Activities**

## **5 GOL related activities**

### **5.1 Watershed Management Protection Authority (WMPA)**

NTPC made payment to the WMPA in December 2006 after receipt of the official qualifications and requested for the annual payment from the WMPA. WMPA has sent a field mission to the Vietnam border via Ban Maka in preparation to requests from the POE regarding their upcoming January 2007 mission. WMPA has changed its fiscal year so that now it is from July – June every year.

### **5.2 Optimization of Salvage Logging on the Nakai Plateau**

Salvage Logging Operations have commenced in October 2006, and the transport of logs off the Nakai Plateau commenced in November. The Chairman of the Salvage Logging Committee issued a Decision regarding the road use of salvage logging truck traffic in November which is currently being implemented. Trucks will specifically and only use 2 routes: 1) Ban Thalang to Laksao during the hours of 22:00 – 06:00 while the remaining hours are for NT2 Construction traffic and 2) The new road built to access to Route No. 12 nearby Ban Thongkong. The GoL is preparing progress reports for distribution to the IFI's commencing in December 2006 and should be available in January 2007. The Salvage Logging Committee held its first coordination meeting with the NT2 implementing partners such as the RMU, WMPA, VFA and NTPC.

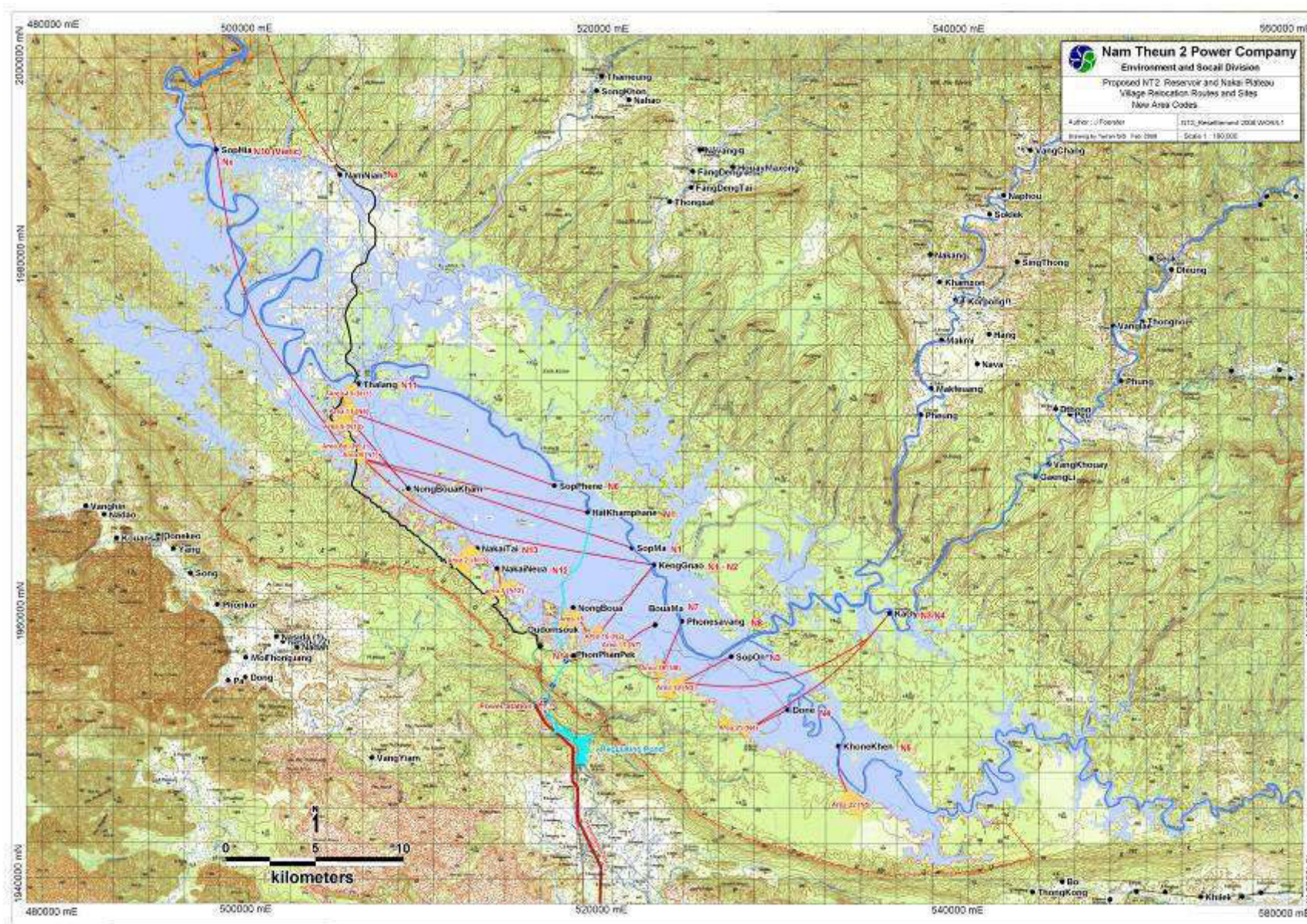
### **5.3 Social issues (RMU & DWG)**

See social section.

## **Annexes**



## Proposed NT2 Reservoir Nakai Plateau Village Relocation Routes





## Transition Resettlement Schedule

