Nam Ngiep 1 Dam Hydropower info by Hobo Maps - Home **Go Back to Hydropower Web Page**

Nam Ngiep 1 Dam image below:

Nam Ngiep 1 Hydropower project is located on the Nam Ngiep (river) which originates in Xiang Khouang Province near the Plain of Jars and runs 160 km before joining the Mekong River near Paksan 1,300 meters lower in elevation. The main dam, a re-regulation dam and two powerhouses are located in Bolikhan District, Bolikhamxay Province while a major part of the reservoir area is in Hom District, Vientiane Province.

The main dam is 9 km upstream of Hat Gniun village in Bolikhan District and creates a 70-km-long narrow reservoir that extends up the Ngiep valley as far as Thathom District. The dam is positioned within a steep natural canyon in the lower part of the Nam Ngiep catchment area which creates a large reservoir and allows for seasonal regulation.

The project is the most downstream dam on Nam Ngiep and is located about 50 km northwest of Paksan town. The reservoir is the biggest within Nam Ngiep catchment area since its catchment covers over 81% of the Nam Ngiep total catchment area.

The Project is owned, managed and operated by the Nam Ngiep 1 Power Company (the Company) whose shareholders are the Kansai Electric Power Company of Japan (45%), Thai-based EGAT International Company Limited (30%) and Lao Holdings State Enterprise (25%).

Project financing was in part provided by Thai-based banks - Exim Bank, SCB, KBank & Others

Nam Ngiep 1 project image below:

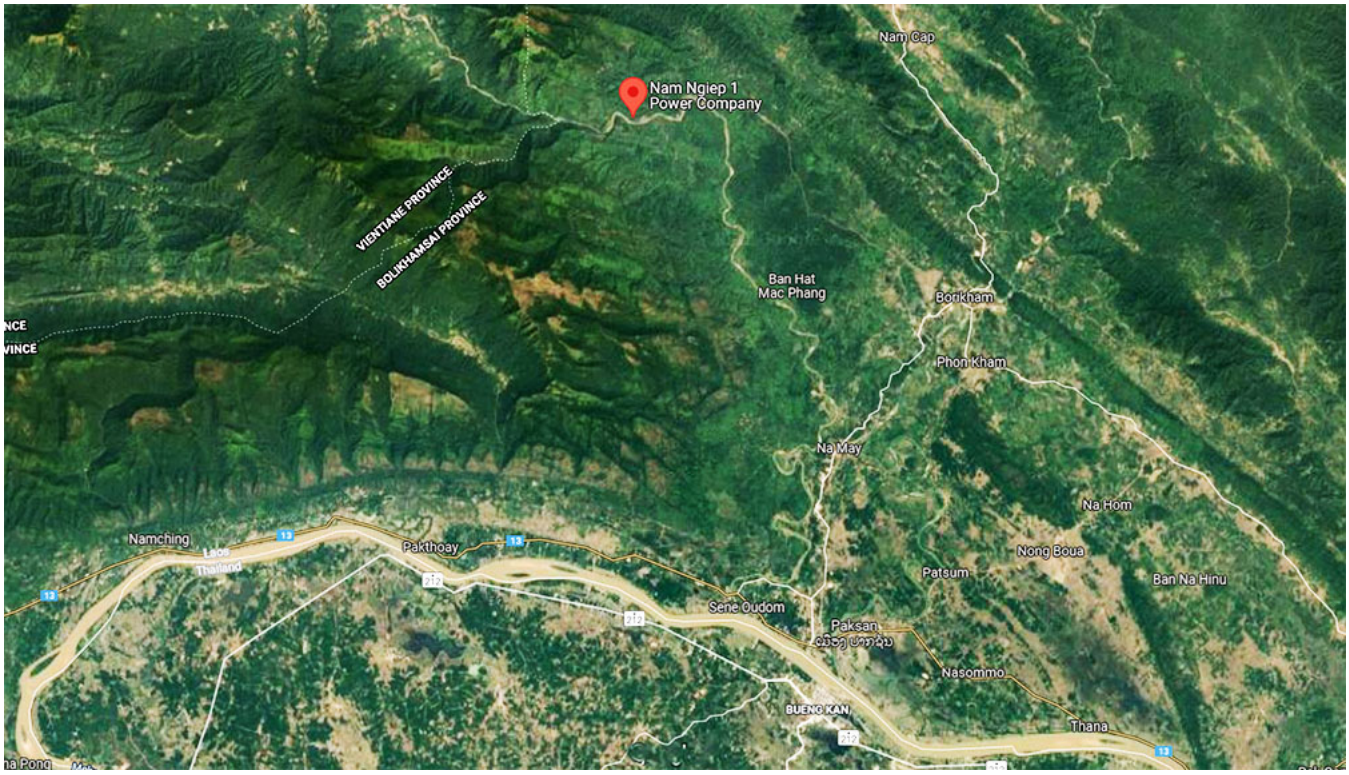
On 27 August 2013 a Power Purchase Agreement with Electricity Generating Authority of Thailand (EGAT) was signed by the Nam Ngiep 1 Power Company Limited and the same day a 27-year Build-Operate-Transfer Concession (BOT) Agreement was signed with Ministry of Planning and Investment of Lao PDR. The construction of the Project started in late 2014 and the Commercial Operation Date (COD) was certified in September 2019.

The 290 MW Nam Ngiep 1 Hydropower Project consists of a main dam and main powerhouse as well as a re-regulation dam and re-regulation powerhouse located along the Nam Ngiep. The main powerhouse is located immediately downstream of the main dam and has 272 megawatt installed capacity from two Francis turbines. All energy produced from this power plant is to be sold to EGAT in Thailand via a 120 km-long 230 kV transmission line to the Nabong Substation in Vientiane Capital for re-transmission to Thailand. The re-regulation dam powerhouse has 18 megawatt installed capacity and the energy produced from this power station is to be sold to Electricite du Laos (EDL) for local consumption.

The power station is planned to operate on a daily basis in intermittent mode. The exact production mode will depend on the availability of water in the reservoir and demand requests by EGAT. The project is designed for daily peaking operation (such as 16 hours on and 8 hours off) for six days of the week with annual energy output of 1,515 GWh for export to Thailand under a Power Purchase Agreement agreement with EGAT.

Nam Ngiep 1 Hydropower project facilities shown in aerial image below:

Location of the Nam Ngiep 1 Hydropower project shown in satellite image below near coordinates 18°38'49.2"N 103°32'31.2"E (18.647, 103.542):



The 167 meter high Main Dam is a roller-compacted concreted gravity dam approximately 530 meters long with a crest elevation 323.5 meters above sea level. Water from the reservoir drops 130 meters to the Main Powerhouse located on the left bank of the river when looking downstream.

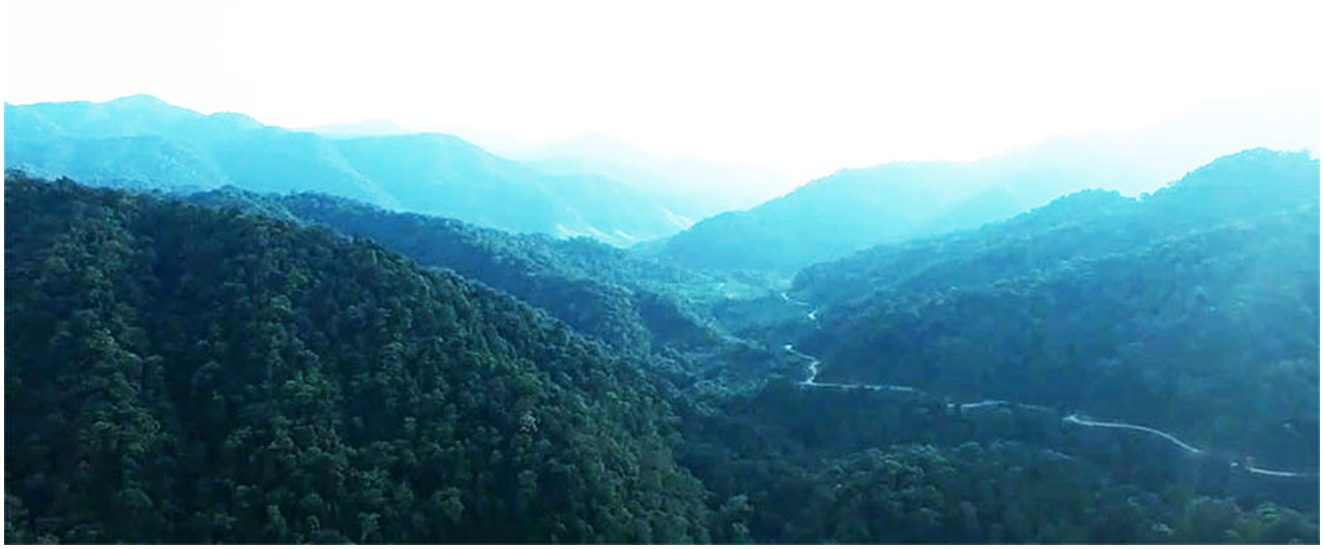
Power intakes, intake gates and penstocks are installed in the main dam body. The penstocks are covered in concrete and embedded in the left side of the dam with intakes located about 43 meters below the reservoir normal operating surface level. The main dam has four radial gate spillways on top of the main dam to safely pass flood flows. The gates discharge onto a ski-jump style spillway with energy-dissipation structures.

The Main Dam creates the Nam Ngiep 1 Main Reservoir with a surface area of 70 square kilometers at full supply level and storage capacity of 1,192 million cubic meters of water. The reservoir depth is about 167 meters at the Main Dam and decreases to just a few meters at the end of the reservoir about 70 km upstream. The facilities around the main dam are a river diversion tunnel, a gated spillway, an intake structure and penstock, a surface powerhouse, outlet facilities and related accessory equipment.

Nam Ngiep 1 Regulating Dam and powerhouse images below:

Nam Ngiep 1 local offices in Bolikhamxay town below

Typical landscape in area of Nam Ngiep 1 project shown below:



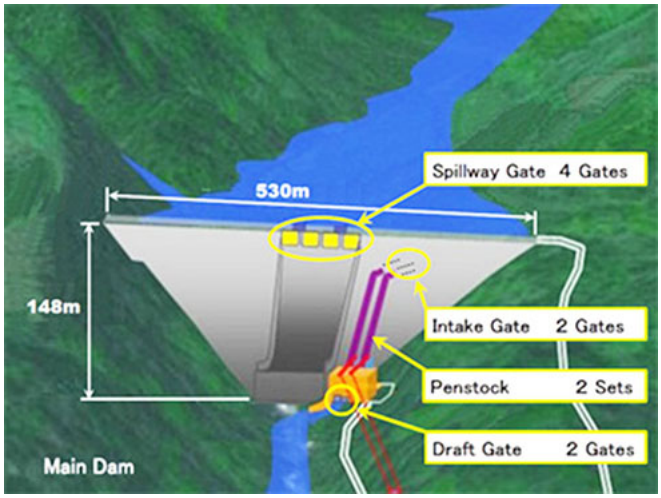
Transmission lines of the Project are:

1) a double-circuit 230 kV line running 130 km from the Main Dam Switchyard to Nabong substation for export to Thailand and

2) a single-circuit 115 kV line running 40 km from Re-regulation Dam Switchyard to Paksan Substation for Lao domestic supply

Project details below:

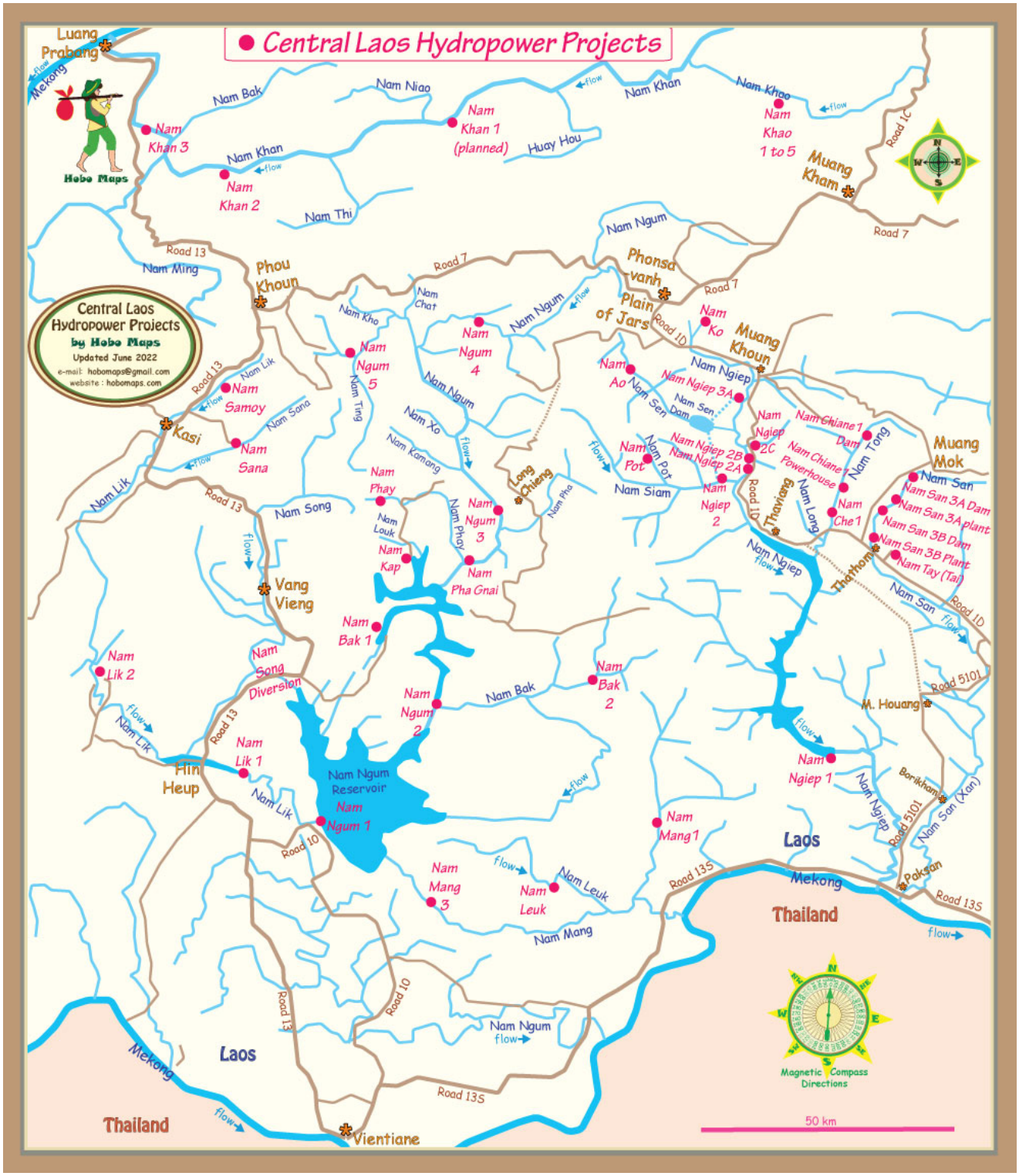
Nam Ngiep 1 Main Reservoir	
Reservoir surface area	66.9 square kilometres at normal level
Effective storage capacity	1.2 billion cubic metres
Catchment area	3,700 square kilometres
Average annual inflow	4.7 billion cubic metres or 148.4 m3/s
Nam Ngiep 1 Main Dam	
Type	Roller-Compacted Concrete Gravity Dam
Crest height	167 metres
Crest length	530 metres
Spillway Discharge Capacity (4 x radial gates)	5,210 cubic metres per second
Penstock Tunnel Length	185 metres
Penstock Tunnel Diameter	5.2 metres
Nam Ngiep 1 Main Powerhouse	
Turbine and generator	2 Francis Units
Effective head	130.9 metres
Rated output	272 megawatts
Annual power generation	1,546 gigawatt hours
Transmission line	230 kilovolt line, 125 km to Nabong Substation
Nam Ngiep 1 Re-Regulation Reservoir	
Reservoir surface area	1.27 square kilometres at normal level
Effective storage capacity	4,600,000 cubic metres
Catchment area	3,725 square kilometres
Nam Ngiep 1 Re-Regulation Dam	
Type	Concrete Gravity Dam
Crest height	20 metres
Crest length	90 metres
Discharge Capacity (fixed wheel gate)	5,210 cubic metres per second
Nam Ngiep 1 Re-Regulation Powerhouse	
Turbine and generator	1 Bulb Unit
Effective head	12.7 metres
Rated output	18 megawatts
Annual power generation	105 gigawatt hours
Transmission line	115 kilovolt line, 40 km to Pakxan Substation



Nam Ngiep 1 powerhouse interior image below:

Nam Ngiep 1 project downriver image below:

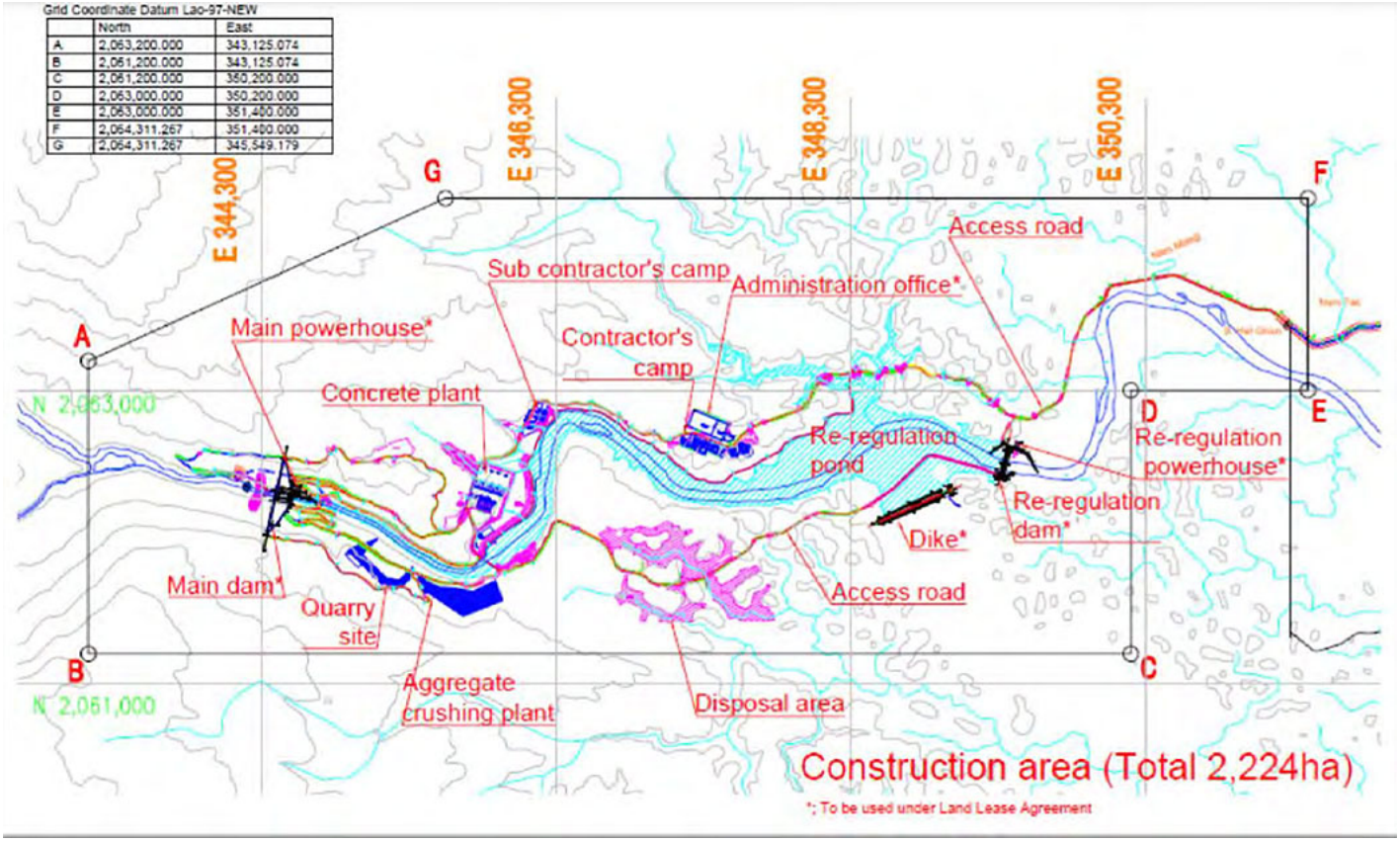
Location of the project is shown on lower right side of map below:



Click HERE to see our hydropower web page for the greater Nam Ngiep catchment basin area which describes the various dams, reservoirs and diversion projects in the drainage basin which are often inter-connected.

Below info and images from 2014 Nam Ngiep 1 Social Impact Study published prior to start of construction so actual construction may not match perfectly.

Nam Ngiep 1 construction area project layout as planned below.



Nam Ngiep 1 project roads map below:

2.2.6 Access Roads

Access roads requiring improvement or new construction run for a total of about 58.42 km, as shown in Table 8 and Figures 5 and 6; of these, 21.2 km of the existing road from Ban Nonsomboun to Ban Hat Gniun and 9.25 km of the pre-existing JICA road[5] need rehabilitation. Another 11.2 km of newly constructed permanent road will be built from Ban Hat Gniun to the construction area and within the grounds of the project facilities. 16.8 km of temporary road will be required for transportation within the construction area. The access road will also be used for transportation and access to the new resettlement site located on the right bank behind the dyke. Impacts of the Access Roads are described and addressed in a separate LACP-AR. Resettlement related to specific access roads crossing the Nam Ngiep River into the Houay Soup resettlement area will be outlined in this REDP.

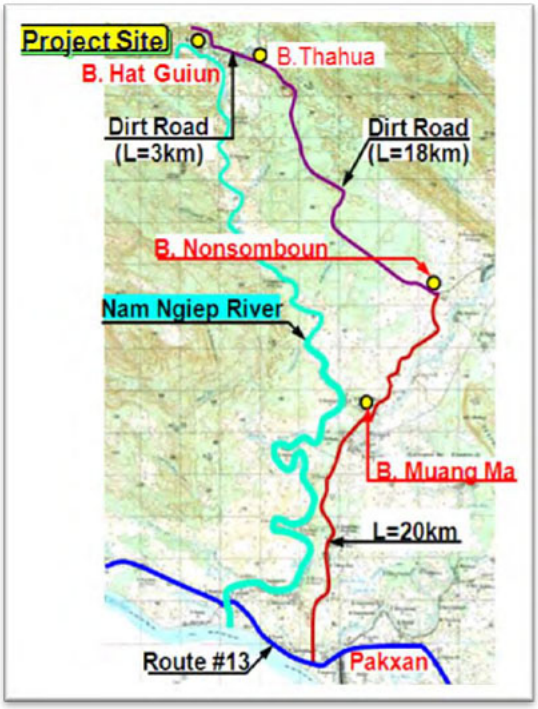


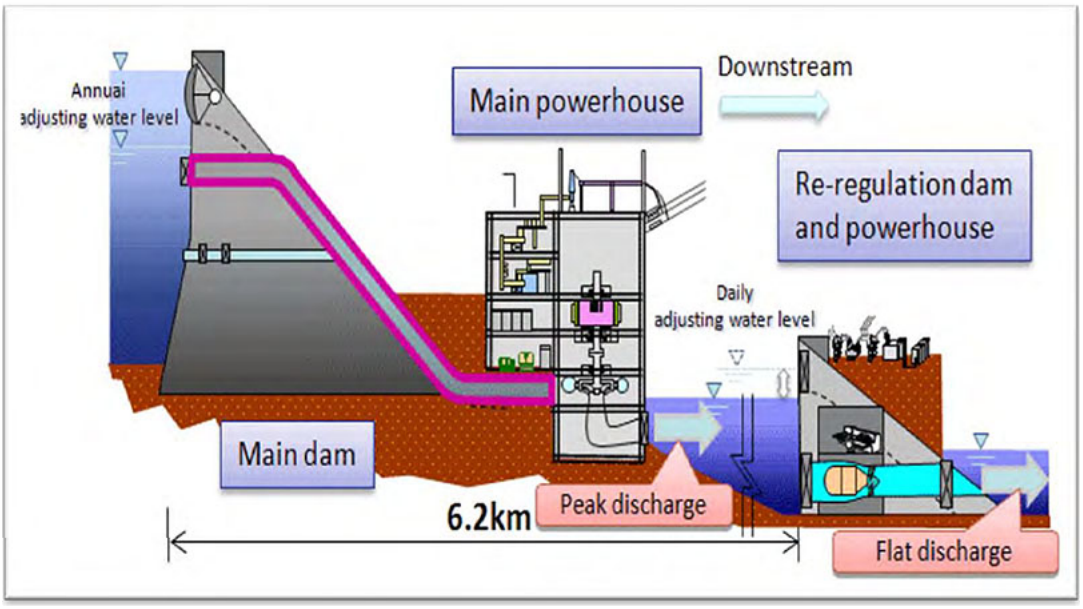
Figure 4: Road route plan for new access roads in the construction area

Dam and Reservoir. The Nam Ngiep 1 Hydropower Project (NNP1) will build a 148 m high dam located in the Nam Ngiep River close to Hat Gniun village. The NNP1 catchment is 3,700 square km at the dam site. The Project reservoir will be narrow, long and deep. The reservoir effective storage capacity is 1,192 million cubic meters at Full Supply Level (FSL, 320 MSL). At this level the total surface area of the reservoir will be 66.9 square km. The Minimum Operation Level will be at 296 MSL.

Waterways. Water will be spilled through 4 gates at the main dam, where electricity will be produced via turbines and then discharged into the re-regulation pond. To avoid
fluctuations throughout the day downstream, a re-regulation dam will be built through which a regulated discharge will take place. The re-regulation dam is 20.6 meters high and creates a re-regulation pond with a surface of 1.27 square km and an effective storage capacity of 4.6 million cubic meters at Full Supply Level. Above the Minimum Operating Level, water will be used to generate electricity for local consumption.

Power Stations. A semi-underground power station will be sited on the left bank of the Nam Ngiep River downstream of the dam. The power station will allow electricity production with a rated output of 272.8 MW at the substation. The average annual energy production is estimated to be 1,515 GWh. The smaller powerhouse downstream of the reregulation dam will allow electricity production with a rated output of 17.6 MW at the substation and average annual energy production of 105 GWh.

Nam Ngiep 1 project power plant image below:



Transmission Line. A 125 km-long 230 kV transmission line will connect the switchyard at the power station to the Nabong substation near Vientiane. The NNP1 transmission line will run parallel with the NNP2 transmission line much of the way. At Nabong substation the transmission line will link with several other transmission lines for power transmission to recipients in Thailand.

2.2.5 Transmission Lines

There are two transmission lines (T/L) connecting the project, a 230 kV line and a 115 kV line. The 230 kV transmission line will be constructed by the Project and routed from the powerhouse of the main dam to Nabong Substation, for a total of 125 km in length. The 115 kV transmission line will be constructed under the full responsibility of Électricité de Lao (EdL) and routed from the powerhouse of the re-regulation dam toward Pakxan Substation, running in parallel with the first line before diverging at Ban Nampa, with a length of 40 km. Additionally, the Project will use a 22kV line owned by EdL to provide electricity to the construction site as well as to the new resettlement site of Houaysoup, located in Bolikhan district. This 22kV line will originate in Pakxan, continue to Nonsomboun, and from there along the Access Road to the dam site. This transmission line will be installed by upgrading and extending (in Hatsaykham) an existing transmission line and lies within the right-of-way of existing roads where new transmission line pols have to be installed.

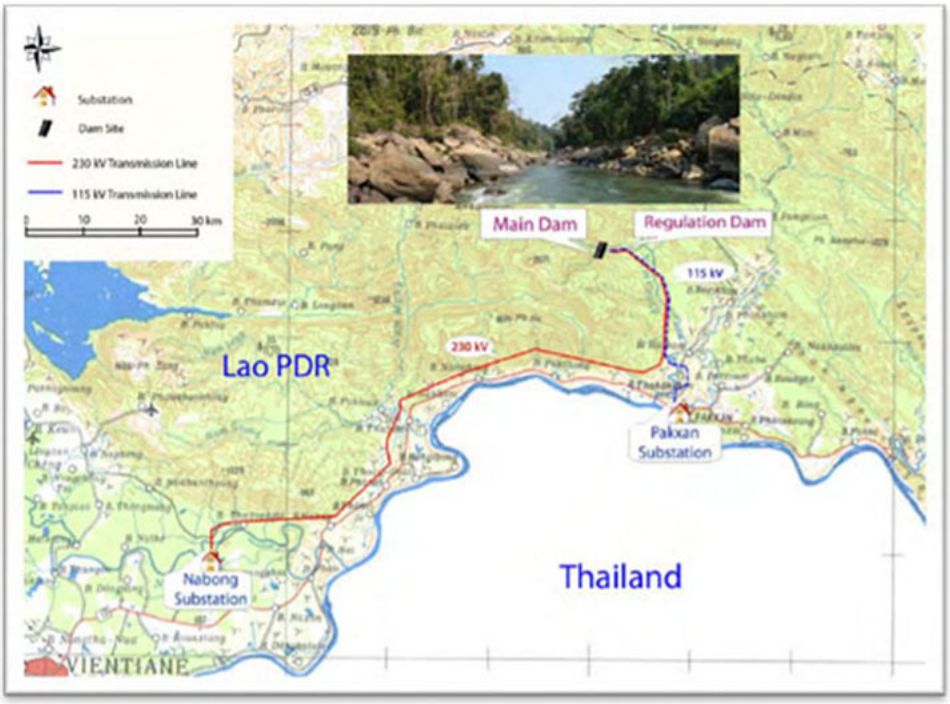


Figure 3: Alignment of Transmission Lines

Nam Ngiep 1 dam statistics chart below:

The main dam will be a roller-compacted concrete (RCC) type with 148 m in height situated in a gorge that cuts between 2 mountains: Mt. Huasua to the northeast and Mt. Katha to the southwest. The site is at about 4.9 km upstream from Ban Hatsaykham and 9.4 km upstream from the main village Ban Hat Gniun. The main dam together with the main powerhouse covers permanently an area of 11.8 ha.

Facility	Items	Unit	Specifications
Main dam	Type	-	Concrete gravity dam (Roller-Compacted Concrete)
	Dam height	m	148.0
	Crest length	m	530.0
	Dam volume	10^3m^3	2,034
	Crest level	MSL.m	322.0
Spillway	Gate type	-	Radial gate
	Number of gates	-	4
	Design flood	m^3/s	5,210 (1,000-year)
Intake	Type	-	Bell-mouth
	Number	-	2
	Discharge capacity	m^3/s	230.0
Penstock	Type	-	Covered by concrete and embedded

Nam Ngiep 1 reservoir info chart below:

2.2.7 Reservoir and Reservoir Lifetime

The main dam will create a 66.9 km^2 reservoir. The reservoir will be rather narrow, but long and deep, extending about 70 kilometres in length. The maximum water level is set for Mean Sea Level (MSL) 320 m and the minimum water level at MSL 296 m.

Facility	Items	Unit	Specifications
Main Reservoir	Flood water level	MSL.m	320.0
	Normal water level	MSL.m	320.0
	Rated water level	MSL.m	312.0
	Minimum operating level	MSL.m	296.0
	Available depth	m	24.0
	Reservoir surface area	km^2	66.9
	Effective storage capacity	10^6m^3	1,192
	Catchment area	km^2	3,700
	Average annual inflow	m^3/s	148.4
		mill.m^3	4,680

Table 9: Technical Specifications Main Reservoir (Source: Technical Report, May 2013)

The re-regulation dam will create a second reservoir of 1.27 km^2, with maximum water level of MSL 179 m and minimum water level of 174 m.

Facility	Items	Unit	Specifications
Re-regulation pond	Flood water level	MSL.m	185.9
	Normal water level	MSL.m	179.0
	Rated water level	MSL.m	179.0
	Minimum operating level	MSL.m	174.0
	Available depth	m	5.0
	Reservoir surface area	km^2	1.27 at NWL
	Effective storage capacity	10^6m^3	4.6
	Catchment area	km^2	3,725

Table 10: Technical Specifications Re-regulation Reservoir (Source: Technical Report, May 2013)

Nam Ngiep 1 project reregulation dam and pond info below:

A free overflow type concrete gravity dam of 90.0 m length and 20.6 m height will be built 6.2 km downstream from the main dam, 1.3 km downstream from Ban Hatsaykham and 3.2 km upstream from Ban Hat Gniun. Additionally, a dyke on the right bank river side will prevent unregulated water flows into the low-laying areas of adjacent Houaysoup, while providing the opportunity for an irrigation system in the resettlement site of Houaysoup. The Re-Regulation Dam and the related powerhouse cover an area of 2.4ha.

Facility	Items	Unit	Specifications
Re- regulation Dam	Type	-	Concrete Gravity dam
	Dam height	m	20.6
	Crest length	m	90.0
	Dam volume	10^3m^3	23.9
	Crest level	MSL.m	187.0 (non-overflow section)
Re-regulation gate	Type	-	Fixed wheel gate
	Number	-	1
	Discharge Capacity	m^3/s	160
Dyke	Type	-	Concrete gravity (Roller-Compacted concrete) associated with rock-fill dam
	Crest length	m	507.2
	Dam height	m	14.6
Spillway	Gate type	-	Ungate spillway (Labyrinth type)
	Design flood	m^3/s	5,210 (1,000yr)
Intake	Type	-	Open
	Number	-	1
	Discharge capacity	m^3/s	160.0

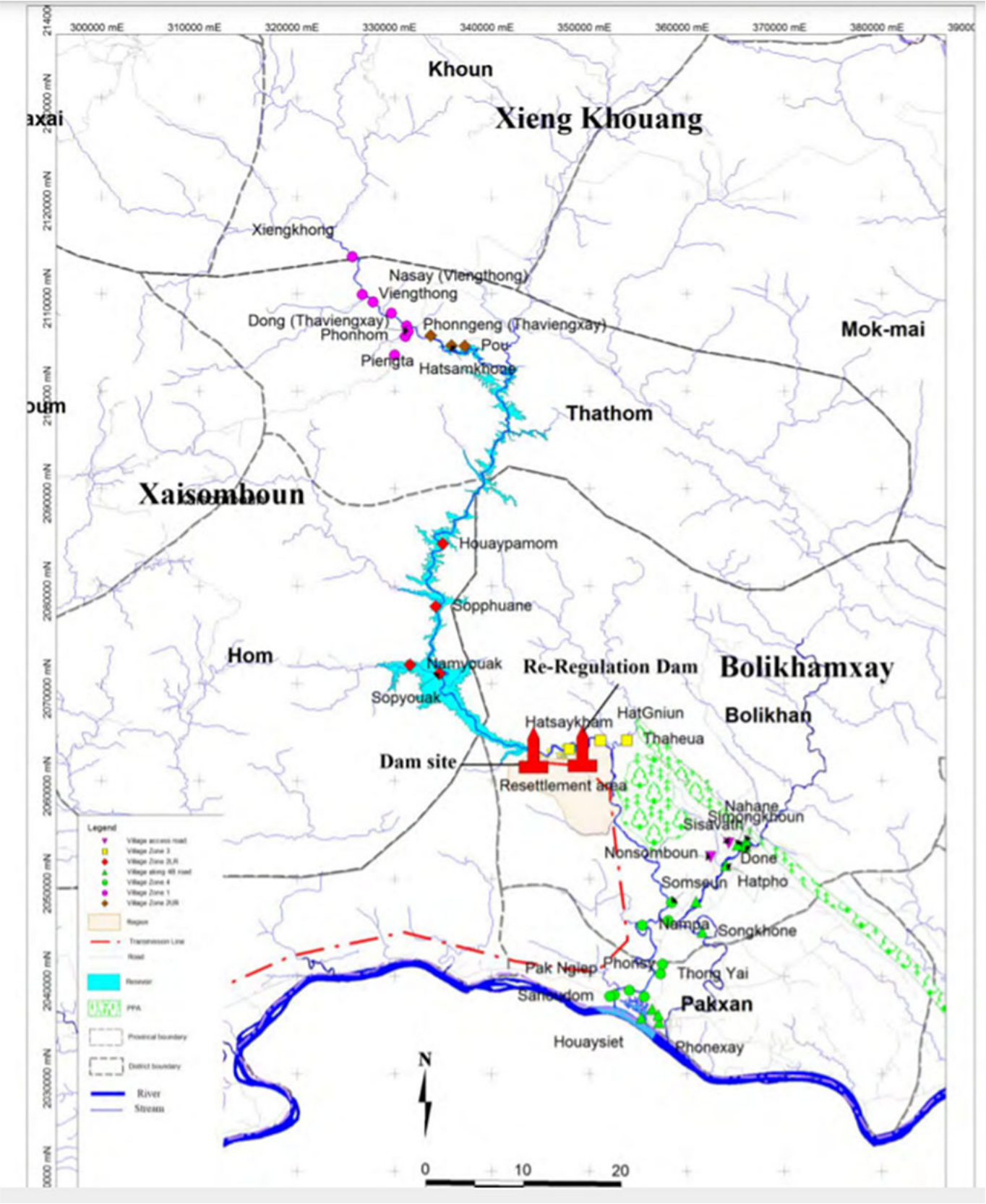
Table 4: Technical Specifications Re-Regulation Dam (Source: Technical Report, May 2013)

. From the re-regulation reservoir, water will be released, thereby producing constant electricity for local consumption and regulating fluctuations from the main dam with even discharge from Monday to Saturday and reduced discharge on Sundays. The powerhouse at the re-regulation dam will have the capacity of 17.6 MW, or 105 GWh per year.

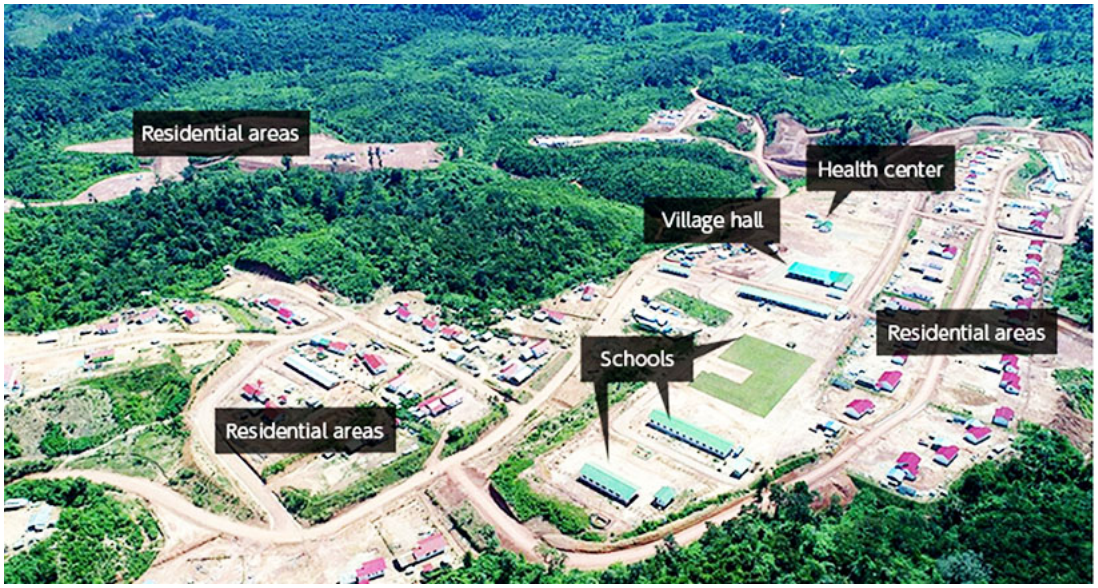
Facility	Items	Unit	Specifications
Powerhouse	Type	-	Semi-underground
	Length	m	46.4
	Width	m	22.1
	Height	m	49.1
Turbine and generator	Maximum plant discharge	m^3/s	160.0
	Gross head	m	13.1
	Effective head	m	12.7
	Type of water turbine	-	Bulb
	Rated output	MW	17.6(at substation)
	Annual power generation	GWh	105 (at substation)

Table 6: Technical Specifications Re-Regulation Powerhouse (Source: Technical Report, May 2013)

Nam Ngiep 1 project location and impact areas shown in map below.



Nam Ngiep 1 resetlement area town below.


Residential areas
Health center
Village hall
Residential areas
Schools
Residential areas