

Chapter 2

The Project's Present Environmental status

2.1 Implementation status of the project at present

The solar power plant project is located at Moo 11, Baan Jok, Don Chomphu Sub-district, Non Sung District, Nakhon Ratchasima Province, at the latitude: 15°11'26.03" North, longitude: 102°20'42.89" East, and altitude: 159 meters. The project area is farmland and its surrounding area is mostly deserted and waste grass land.



Figure 2.1 shows the area conditions



Figure 2.2 The project area conditions, and utilization of the nearest lands and houses/community

2.2 Physical environmental resources

2.2.1 Topography⁵

The geographical features of Nakhon Ratchasima Province consist of high mountains and lowlands, both shallow-wavy and deep-wavy areas, which are divided into 3 areas:

1) The area of high mountain ridges in the southern part of the province, having the altitude above sea level of over 250 meters. The area occupies the districts of Pakchong, Pak Thong Chai, Wang Nam Keaw, Kornburi, and Soeng Sang. These ridges are the origin of many rivers and waterways which flow to the east of the region: Moon River, Lam Sae, Lam Pra Plerng, and Lamplaimat. The area between the ridges is mostly shallow-wavy and deep-wavy. The south of valley has a considerable gradient, causing rather high purging and crumbling ground. The area is needed to reserve and conserve the natural conditions, in order to keep the balance of the ecological system and as a natural tourist place as well as conserving the wellhead source.

2) The highland area in the central part of the province has the altitude above sea level of between 200 to 250 meters. It is in the districts of Dan Khun Thot, Theparak, Sikhio, Sung Noen, Non Thai, Phra Thong Kham, Kham Thale So, Mueng Nakhon Ratchasima, Chok Chai, Nong Bun Mak, Chakkarat, Chaloem Phra Kiat. The area is mostly shallow-wavy, except that the area near the foothills is deep-wavy. There are many rivers flowing past the basin area: Lam Sae, Lam Pra Plerng, Lamtakong, and Moon. Some areas are plains which are ruined forests, and presently used as agricultural areas. However, some of these areas are left deserted, which are set to be the area for future land development preparation. They could be used as areas for agriculture, livestock, industry and city community, and the land for agricultural reform.

3) The wavy areas and the plains in the northern part of the province, have altitude above sea level of not over 200 meters. They are in the districts of Kaeng Sanam Nang, Ban Lueam, Bua Yai, Sida, Bua Lai, Non Daeng, Prathai, Lam Thamenchai, Mueang Yang, Chum Phuang, Phimai, Khong, Kham Sakaesaeng, Non Sung, and Huai Thalaeng. These areas are shallow-wavy, having uplands and farmlands alternately. Some are plain areas - at the area of the banks of Lam Chiang Krai and Lamplaimat and Lamsatech. These areas are suitable for cultivation, city development, and fishing industry development.

The project is located in Don Chomphu Sub-district. The area condition is mostly wavy and little gradient, used for growing field crops and fruit trees. For the conditions of flat to rather flat areas in the east, these areas are used as farmlands. The important water sources are Bung Sisuk, Bung Khon Chomphu, Nong Grad, Nong Baan, and Baan Plor Paw reservoir. The areas have Lam Chiang Krai flowing past in the north and Lam Khlong Khan Lung flowing past in the center.

⁵The nation's power database system <http://www.thaienergydata.in.th>

2.2.2 Meteorological data and air quality⁶

General climate of Nakhon Ratchasima Province is influenced by 2 types of monsoons: northeast monsoon (starting since the middle of October to February), from the high pressure areas of north hemisphere (Mongolia and Mainland China); and southwest monsoon (starting since the middle of May to the middle of October), from the high pressure areas of south hemisphere (Indian Ocean), which blows from the center as southeast winds and changed into southwest winds when sweeping across the equator, bringing moist air mass from the Indian Ocean to Thailand. This causes Nakhon Ratchasima to be generally very cloudy and having heavy rain.

Seasons in Nakhon Ratchasima Province, when considering Thailand's weather, this can be divided into 3 seasons:

1) **Winter** starts from the middle of October to February when the northeast monsoon covers Nakhon Ratchasima since the middle of October. During the middle of October (about 1-2 weeks) is the changing period from rainy season to winter. The weather is fluctuating, sometimes it starts to be cool and sometimes it is still rainy. Some years, the winter may start more slowly than anticipated, depending on the high pressure from Mainland China which spreads out and covers Thailand. If the spread out is slow, the winter would start about the end of October onwards.

2) **Summer** starts from the middle of February to the middle of May, which is the period of changing from northeast monsoon to southwest monsoon. During this period, the North Pole turns towards the sun, especially during April in Nakhon Ratchasima Province, the sun is zenith at noontime. Generally the weather is sultry. In this season, even though the weather is generally hot and arid, sometimes cool weather mass from China may spread down and cover the upper part of Thailand. This causes clashing between cool and hot weather mass (which has previously covered the area) and causes thunderstorm and gusty winds or hails may be falling, causing damages. The thunderstorm occurred in this season is often called "summer storm."

3) **Rainy** season starts from the middle of May to the middle of October. This is the period that the southwest monsoon which is hot and humid from the Indian Ocean sweeps to cover Thailand and inter-tropical convergence zone or monsoon trough which passes over the southern part of Thailand will elevate to pass over the upper area of Thailand, causing Nakhon Ratchasima having heavy downpour in general. During the end of June, inter-tropical convergence Zone or monsoon trough will pass over the southern China, making the rains decreased for some time (may last about 1-2 weeks). Or in some years, this incident may be severe, causing light rain for months. In July, inter-tropical convergence zone or monsoon trough will normally slip back down to the south, passing over Nakhon Ratchasima once more, causing continuously heavy raining again. This will continue until the northeast monsoon sweeps to cover Thailand in replace of the southwest monsoon (during the middle of October), the upper part of Thailand's weather will start to cool and the rains decrease.

⁶Nakhon Ratchasima Provincial Development Plan BE 2555-2558

From the results of weather check of the Nakhon Ratchasima Weather Station, located at Mueang District, the summary of important meteorological data is as follows:

Temperature.

Since the areas of Nakhon Ratchasima Province are mostly highlands, having forests and high mountain ranges linearly boarding the frontier, the weather is rather very sultry in summer and rather cold in winter. The average temperature throughout the year is about 27.4 degrees Celsius: the average of lowest temperature = 22.7 degrees Celsius, and the average of highest temperature = 33.0 degrees Celsius. April was the most sultry month, measured at 42.7 degrees Celsius on 7 April BE 2522. And January was the coolest month, measured at 6.2 degrees Celsius.

Relative humidity.

The relative humidity and air mass as well as the influence of monsoon play the important part in the weather of Nakhon Ratchasima Province. In winter, the period during which the northeast monsoon spreads over Thailand, the weather of the province will be arid and cold. In the morning the weather will be damp and the relative humidity is high and will be dramatically decreased in the afternoon until evening. In summer, the weather will be very arid and sultry and the relative humidity is very low and will be gradually high when approaching rainy season (that is, when the southwest monsoon spreads over Thailand). This monsoon wind blows from the sea, sweeping also steam and humid with it, causing the relative humidity increase successively throughout the rainy season. The average relative humidity all through the year is at 71%, the average highest relative humidity 89%, and the average lowest relative humidity 49%. And the lowest relative humidity is measured at 12%

Rain.

The rain falling in Nakhon Ratchasima Province is mostly caused by depression which moves from South China Sea through Vietnam to the northeastern part of Thailand. In some years, if there was little depression sweeping from the South China Sea to the northeastern region, the areas of the northeastern part and Nakhon Ratchasima Province would be dry and arid, having small quantity of rains. Normally the depression will pass into the northeastern region approx. 2-3 times per year, making good rain quantity. However, the rain caused by the southwest monsoon is in small quantity. This is because the province has the mountain ranges of Petchaboon and Dong Phrayayen to the west, and the ranges of Sankampaeng and Phanom Dong Rak to the south. These ranges block the conveniently blowing in of the southwest monsoon, causing light rain. The average quantity of rain throughout the year is approx: 1019.2 millimeters and there are altogether 105 raining days (average). The month in which the rain falls most is September, having average rain quantity of 202.3 millimeters. Within 24 hours, the highest quantity of rain is measured at 143.7 millimeters.

Wind.

Wind circulation system in Nakhon Ratchasima is clear. In winter, the northeast monsoon spreads over Thailand during October to January, the winds are mostly northeast winds which have average power of about 4-6 kilos/hour. And in the beginning of summer, the winds varyingly blow; the power will be weak until April. Then the winds will change to southwest winds with average power of about 4-6 kilos/hour. In rainy season, during May to June, the winds still blow to the southwest direction, having average power of about 6-7 kilos/hour. And during July to September, the winds will be changed to the west, having average power of about 4-7 kilos/hour. The highest wind power capacity used to be measured in various seasons, is as follows: in winter, the highest power measured at 81 kilos/hour (northeast and east, in November); in summer, the highest power measured at 98 kilos/hour (south, in April); in

rainy season, the highest power measured at 107 kilos/hour and the winds power capacity was of the highest in the peninsular (southwest).

Air Quality

The nearest automatic Weather Measurement Station is far from the project about 42 kilometers. It is used as reference data (which is located at the military residence of 21rd Military Precinct, Mueang Nakhon Ratchasima District), according to Table 2.1. Air quality is up to standard, except that the dust size smaller than 10 microns (PM10) is over standard in each year.

The project area does not have the source of dust; the pollution problem of the dust size smaller than 10 microns (PM10) has not been increased.

Table 2.1 Air quality at the weather measurement station, Mueang District, Nakhon Ratchasima Province

Place / Year		Military residence of 21 st Military Precinct					Standard Value
		2548	2549	2550	2551	2552	
The measured air quality							
Sulfur Dioxide (SO ₂)							300
Average (1 hour) (ppb)	Highest value	13.0	9.0	9.0	14.0	-	
	Lowest value	0.0	0.0	0.0	0.0	-	
	No. of times which are over the standard/No. of times of measurement	0/7,155	7/0,009	6,878/0	/08,000		
Average (1 year)		1.9	1.4	1.8	.26	-	40
Nitrogen Dioxide (NO ₂)							170
Average (1 hour) (ppb)	Highest value	73.0	65.0	73.0	87.0	-	
	Lowest value	0.0	0.0	0.0	0.0	-	
	No. of times which are over the standard/No. of times of measurement	0/7,194	7,213/0	7,489/0	/08,027	-	
Average (1 year)		9.7	8.2	11.0	11.1	-	-
Carbon Monoxide (CO)							30
Average (1 hour) (ppb)	Highest value	4.8	6.8	3.2	3.6	-	
	Lowest value	0.0	0.0	0.0	0.0	-	
	No. of times which are over the standard/No. of times of measurement	0/7,157	0/7,091	7,233/0	0/6,945	-	
Average (1 year)		0.6	0.6	0.5	0.5	-	-
Carbon Monoxide (CO)							9
Average (8 hours)	Highest value	2.8	3.7	2.0	2.2	-	
	Lowest value	0.0	0.0	0.0	0.0	-	

(ppb)	No. of times which are over the standard/No. of times of measurement	0/7,288	7,052/0	7,422/0	,7/0176	-	
Average (1 year)		0.6	0.6	0.5	0.5	-	-
Ozone (O ₃)							100
Average (1 hour) (ppb)	Highest value	105.0	81.0	80.0	101.0	-	
	Lowest value	0.0	0.0	0.0	0.0	-	
	No. of times which are over the standard/No. of times of measurement	0/7,251	6,833/0	6,776/0	,7/0723	-	
Average (1 year)		23.6	17.8	22.2	21.8	-	-
Dust particle smaller than 10 microns (PM10)							120
Average (1 hour) (ppb)	Highest value	153.1	209.0	173.6	181.2	-	
	Lowest value	20.7	29.9	31.3	11.7	-	
	No. of times which are over the standard/No. of times of measurement	266/20	270/33	243/17	52/97	-	
Average (1 year)		70.5	77.4	72.8	46.7	-	50

Source : Data Processing and Plan Unit, Office of Air and Sound Quality Management (26 January BE 2553)

2.2.3 Geology and earthquake

Earth Structure

Nakhon Ratchasima has important mineral and rock granulation products: basalt, limestone, and rock salt. There are 30 holders of mineral leases, covering the area of 2,982 rai, 41 ngarn, and 1,198 square wah. The areas are classified as rock salt area: 959 rai, 5 ngarn, and 277 square wah; the area of shale mineral or industrial sand: 233 rai, 3 ngarn, and 80 square wah; the area of sandstone-type cameo mineral: 110 rai, 14 ngarn, and 412 square wah; the area of marble mineral: 290 rai, 7 ngarn, and 134 square wah; the area of marble mineral and limestone-type industrial rock: 717 rai, 6 ngarn, and 146 square wah; the area of basalt-type industrial rock: 673 rai, 6 ngarn, 149 square wah. The average total mineral products value is 612.72 million Baht. The highest mineral product made in 2552 was limestone. The industrial rocks (for construction) were produced at 501,287 metric tons; the second, marble rocks: 408,333.63 metric tons; and basalt rocks: 347,071 metric tons, as shown in Figure 3.1.

For the project location, the geological conditions are sediments, which streams having brought gravel, silt, and clay, to accumulate along the watercourse, the river's levee, and the flooded basin (Qa).

Soil structure

Soil conditions in Nakhon Ratchasima Province are mostly sandy loam which keeps little moisture and has low water retention. Some part of them is 30.5% alkaline soil (of all the provincial area), some parts consists of clay of moderately to rather highly abundant which is suitable for cultivation (only 30.50 % of the total area). Soils can be divided according to the following groups:

Figure 2.3 The project's geological conditions^{7 (7)}

Soil Group

From the study of problems of the conditions of soils used in agriculture of Don Chomphu Sub-district, it is found that some types of soils are obstacles to crops growing, being the physical and chemical limitations in the following 3 characteristics:

1) The soils area is somewhat highland sandy of approx. 2,670 rai or 10.53% of the sub-district area, which consists of 40B soil group. The area conditions are wavy and little gradient (2-5%). The soil drainage is medium to good. The soil abundance is low. The capacity of particle exchange is low. The alkaline salt saturation is low. The upper soil body is sandy loam, and is strong to medium acidic (pH5.0-5.5). The lower soil body is sandy loam, and is strong to slightly acidic (pH4.5-6.5).

2) The soils are is extremely highland sandy of approx. 99 rai or 0.39% of the sub-district area, which consists of 44B soil group. The area conditions are wavy and little gradient (2-5%). The soil drainage is good. The soil abundance is low. The capacity of particle exchange is low. The alkaline salt saturation is low. The upper soil body is sandy loam, and is little to slightly acidic (pH6.0-6.5). The lower soil body is sandy loam, and is slightly to medially acidic (pH6.5-7.0).

3) The soils area is alkaline and somewhat lowland sandy of approx. 18,683 rai or 73.69% of the sub-district area, which consists of 20th soil group. The area conditions are smooth to rather smooth and gradient (0-2%). The soil drainage is rather bad. The soil abundance is low. The capacity of particle exchange is medium. The alkaline salt saturation is medium. The upper soil body is sandy loam to sandy clay-loam, and is little to medially acidic (pH6.0-7.0). The lower soil body is sandy clay-loam to clay mixed with silt, and is neutral to alkaline (pH7.0-8.0).

The project is located in the area of 20th soil group. The soils are alkaline and somewhat sandy in the lowlands. They are not suitable for growing crops according to origin material of the soil group found, as shown in Figure 3.2.

Earthquake.

Thailand is a part of Eurasian plate which is surrounded by 2 tectonic plates: Indian Ocean plate and Pacific Ocean plate. Nakhon Ratchasima Province is the location of the project, which is situated in the risky zone of earthquake (zone 0) according to the map showing Thailand's risky areas of earthquake (2nd improved edition, BE 2548) issued by the Department of Mineral Resources. The risk causing violence is at III level. People residing in high buildings will clearly feel the earthquake, especially the ones living or working on the upper floors. Most people will not know that the quake occurs and parked vehicles may slightly move. The vibration is similar to that of when the truck is passing by. Thus the area is regarded as low risk..



2.2.4 Hydrology and water source

The important natural water sources in Don Chompu Sub-district, are as

Lam Chiang Krai flows pass the northern part of Don Chomphu Sub-district. It flows pass Baan Mara at Moo 3, Baan Sa Phruan at Moo 4, Baan Don Ree at Moo 5, Baan Jok at Moo 1, and then flows down to Moon River in Baan Som at Moo 2. This makes the agriculturists at these villages being able to use water to sow rice for seedlings. When dry season comes, the water is salty, thus rendering low-yield cultivation.

Bung Talad Kiab flows pass Baan Plor Paw at Moo 7. At present, dredging up is made and dike is built, the agriculturists use water for sowing rice for seedlings, consumption, and grow dry season crops.

Nong Tok Mok is a swamp in the area of Baan Mueang Tee at Moo 6. The agriculturists use water from this swamp to sow rice for seedlings (having the area of 400 rai).

Man-made water sources

Bung Si Suk. The agriculturists use water from this swamp for consumption within the village only, using it to be the village's water supply (having the area of 167 rai). This water source is in Si Suk village at Moo 8.

Bung Mara is the water source which the Green Isan Project had improved. The agriculturists use water from this source to grow vegetables and for consumption. The area is about 20 rai and located in Mara village at Moo 3.

Nong Tian is the water source in the public place located in the center of Si Suk village at Moo 5. The villagers use water from this source for consumption. This source is improved at present.

Nong Bon is the water source in Baan Don Chomphu (Moo 1). The people of 4 villages (Moo 1, 9, 10, and 12), use water from the source for consumption.

Besides, there are various ponds located in many villages which the villagers have used for consumption. The government has generated some budget to build and improve these water sources which are not agriculturally important.

Water quality⁷

The important water quality of Moon River which was checked in 2551 at Lam Chiang Krai Bridge, Non Sung Sub-district, Non Sung District, Nakhon Ratchasima Province: pH=7.34, DO (Dissolve Oxygen) = 6.5 mg/l, and BOD Biological Oxygen Demand = 1.6 mg/l. The water quality is moderate.

2.3.1 Forest resources⁹

Nakhon Ratchasima Province's agricultural area is 70% of total area. The second is the forest area, 18% of total provincial area. The others are community and buildings area – 6% of total area; miscellaneous area: grassland, ancient city, etc. – 4% of total area; and water source area – 2% of total area.

Forest area of Don Chomphu Sub-district, which is the project location, is approx. 457 rai or 1.8% of the sub-district area (which is denuded forest). There is no forest in the project area.

2.3.2 Wild animal resources

About 1 kilometer radius around the project area is paddy fields and some areas are neglected and unoccupied, having grass and low bushes covering the place. There are no biological resources on land. About 5 kilometers from the project, there are paddy fields and waste lands.

2.3.3 Water resources

The population of Nakhon Ratchasima Province is mostly agriculturists, having to depend on water source for earning a living. The Province has 9 important natural water sources: Upper Moon river basin, Lam Phra Plerng river basin, Lam Ta Khong river basin, Lam Chaing Krai river basin, Lam Chee river basin, Lam Sa Taech river basin, Lower Moon river basin, Lam Jakkarat river basin, Lamplaimat river basin. The total area of river basin is 20,493 square kilometers.

⁷ http://iwis.pcd.go.th/IWIS/report/report1.php?river_id=38

The natural water sources of important rivers of Don Chomphu have the area of approx. 1,285 rai or 5.06% of the sub-district area, which comprise of both natural and man-made water sources, for instance:

- 1) The important natural water sources in Don Chomphu Sub-district are Moon River, Lam Chiang Krai, Lam Khlong Khan Lung, Nong Grad, Bung Samrong, and Bung Don Chomphu.
- 2) Man-made water sources, for ex: Baan Plor Paw reservoir.
- 3) The Development Project on ground water sources, for instance: 4 small scale irrigation projects: Bung Talad Kwian reservoir project, Baan Don Chomphu (Bung Sakae) reservoir project, Baan Mara dike project, and Baan Som (Takud Wian) dike project. (data source: Nakhon Ratchasima Provincial Irrigation Office, 2551). Total area of gaining benefits is 1,550 rai or 6.11%.

2.4 Human beings' utilization value

Nakhon Ratchasima Province has total area of 12,808,728 rai. Most area (69.73% of total area) is used for agriculture, classified as paddy fields = 48.48%; growing crops = 42.48%; and growing others = 7.28% (of total area). The second is forest area = 17.94% of total area. And lastly, community and buildings area = 6.10% of total area. Panoramic data for development and important details are as follows: With such a high land utilization there is a high level of local employment

2.4.1 Land use

From the report issued by the Office of Agricultural Economics, it shows that Nakhon Ratchasima Province's land use is divided according to Figure 2.3, land use of Don Chomphu Sub-district is shown in Figure 2.4, which is detailed in Table 2.2.

Table 2.2 Nakhon Ratchasima's land use⁸

Land use	Area (rai)	Percentage
1.Community area and buildings	781,776	6.10
2. Agricultural area	8,931,032	69.73
2.1 Paddy area	4,329,724	48.48
2.2 Crops growing area	3,793,602	42.48
2.3 Area for growing fruit trees and perennial plants	606,388	3.97
2.4 Area for growing garden plants	25,782	2.82
2.5 Grassland area for raising animals	157,639	0.29
2.6 Others, for ex: aquatic plants, mixed agriculture	17,897	0.20
3. Forest area	2,297,735	17.94
4. Water source area	280,313	2.19

⁸Source : Office of Soil Resources Survey and Research, Land Development Department, Ministry of Agriculture and Cooperatives.

5. Miscellaneous area: grassland, ancient city, etc.	517,872	4.04
Total area	12,808,728	100.00

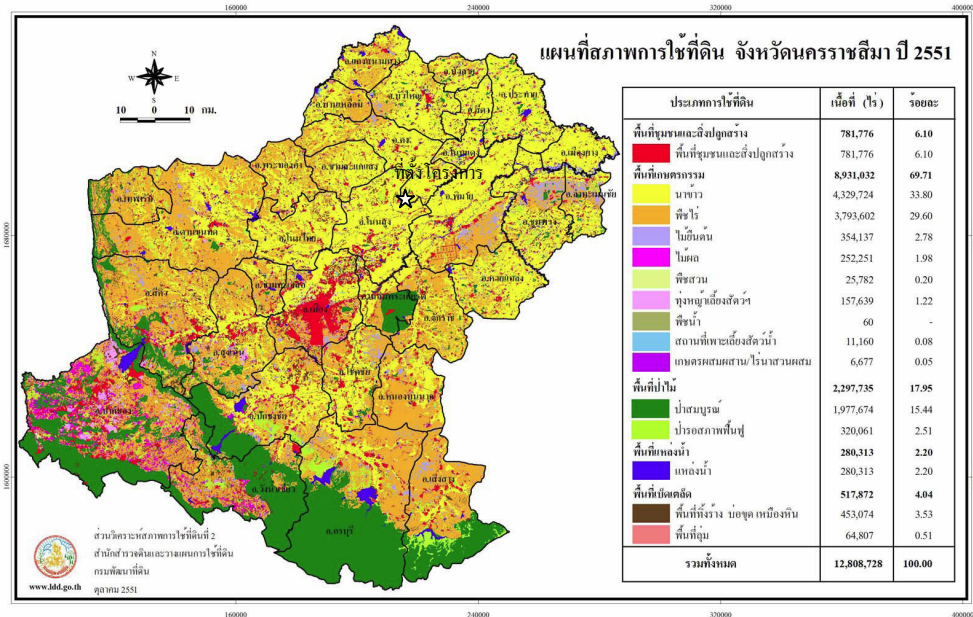
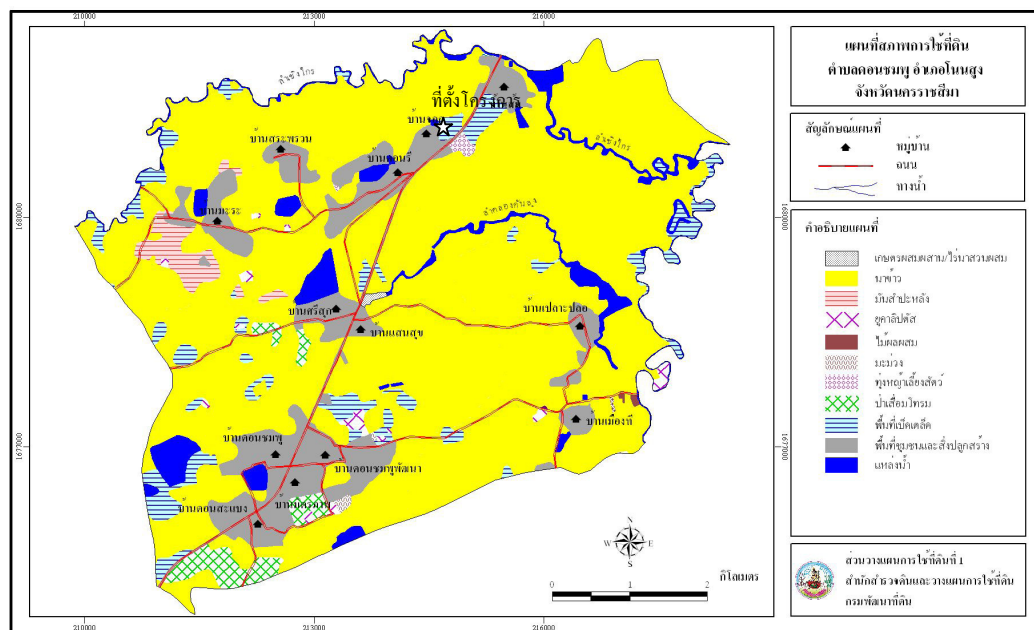


Figure 2.5 Land use of Nakhon Ratchasima Province



ที่มา : ส่วนวิเคราะห์สภาพการใช้ที่ดินที่ 2 สำนักสำรวจดินและวางแผนการใช้ที่ดิน, 2550
ที่ 4 แผนที่สภาพการใช้ที่ดิน ตำบลดอนชมพู อำเภอโนนสูง จังหวัดนครราชสีมา

Figure 2.6 Land use of Don Chomphu Sub-district, Non Sung District, Nakhon Ratchasima Province

From the survey made in 2550, for Don Chomphu Sub-district, by Land Use Conditions Analysis Section 2, Office of Soil Resources Survey and Research, it is found that there was land use in the sub-district as shown in Figure 3.4:

- 1) Community and buildings, having the area of approx. 3,084 rai or 12.17% of total sub-district area, which comprising community, highways, and industrial factories.
- 2) Agriculture, having the area of approx. 19,367 rai or 76.40% of total sub-district area, which is significantly summarized, as follows:
 - Paddy field area of approx. 18,755 rai or 73.99% of the sub-district area.
 - Tapioca plantation area of approx. 353 rai or 1.39% of the sub-district area.
 - Eucalyptus plantation area of approx. 154 rai or 0.61% of the sub-district area.
 - Mixed fruit trees area of approx. 18 rai or 0.07% of the sub-district area.
- 3) Forest, having the area of approx. 457 rai or 1.80% of the sub-district area (it is denuded forest).
- 4) Water, having the area of approx. 1,285 rai or 5.06% of the sub-district area (it consists of natural and man-made water sources).
- 5) Miscellaneous, having the area of approx. 1,160 rai or 4.57% of the sub-district area (it is brushwood, grassland, and lowlands.).

From the analysis of land use conditions of the sub-district, it is found that cultivation is the main occupation. Most agricultural areas are used by the agriculturists to grow rice. However, some areas are forest which should be conserved for the community's benefit. The areas around the project are miscellaneous; most of them are neglected and unoccupied, having low bushes and grass covering them.

2.4.2 Public transportation

Don Chomphu Sub-district is located in the north of Non Sung District, which is far from Non Sung District Office about 14 kilometers. The project area is near the national highway no. 2 (Mitrapap Road), with the following routes:

The national highway no. 2, 4-lane route passing villages at Moo 1, 2, 5, 8, 9, 10, 11, 12 and 13, concrete roads. In every village, the asphalt roads built by the Office of Accelerated Rural Development are used, from Baan Don Ree to Baan Mara.

The transportation between Non Sung District to Don Chomphu Sub-district has been made into 3 types of routes: the asphalt road, the distance from Non Sung to Baan Som (Moo 2) which is the longest (24 kilometers), and to Baan Don Tabaeng which is the shortest (15 kilometers); the mud road, the communication is not convenient during rainy season, the distance from Non Sung to Baan Mara (6 kilometers) which is the nearest village, and to Baan Mueang Tee at Moo 6 (24 kilometers) which is the farthest village. Mittrapap Road runs pass the villages at Moo 1, 2, 5, 8, 10, 11, and 13. For Moo 3 and 4, there is an asphalt road breaking off from Mittrapap Road about 3-4 kilometers. For Moo 6 and 7, there is a mud road breaking off from Mittrapap Road to the south.

2.4.3 Fishery

Nakhon Ratchasima Province has 16,360 operators of raising aquatic animals, with the area of approx. 26,840.25 rai and with the value of 6.07 million Baht. Fish and

shrimp produce are valued at 4.03 and 2.04 million Baht respectively. There is one fishery station breeding fish in the amount of about 30 million fish per year. There are also 13 private farms breeding fish of 130 million per year.

Don Chomphu Sub-district⁹ has fishery done along natural water sources, for ex: Lam Moon and Lam Chiang Krai. The agriculturists have been supported by small size ponds built. Sixty-five agriculturists have been provided with supplementary occupation. However, they lack fish species and knowledge on raising and processing fish.

The important agricultural structure of the province mainly depends on agricultural branches. There is agricultural area utilization of 8,931,032 rai, which is divided into growing rice area: 4,329,724 rai (48.48% of agricultural area utilization); the second is growing crops area: 3,793,602 rai (42.48%) comprising tapioca, sugar cane for industrial use, and corn for feeding animals; area for growing fruit trees and perennial plants: 606,388 rai; grassland area for raising animals: 157,639 rai. There are total 175,624 agricultural households.

In 2552, Nakhon Ratchasima Province had total production value of 33,477 million Baht, divided into in-season rice: 6,955 million Baht; off-season rice: 6,519 million Baht; tapioca: 8,444 million Baht; sugar cane for factories: 2,964 million Baht; corn for feeding animals: 3,811 million Baht. The agriculturist's income from agriculture sector is about 11,559 Baht/month. Their expenses in agricultural sector are about 9,759 Baht/month.

Important principal agricultural problems

1) Soils in Nakhon Ratchasima Province are salty which occupy 2,139,727 rai or 23.96% of the province's total agricultural area. Most soil areas lack soil improvement and nourishment or there is some soil improvement but not enough for crops growth or the soils are hard. The areas occupy 3,245,287 rai or 36.34% of the province's total agricultural area.

2) Nakhon Ratchasima Province has total irrigation area of 786,077 rai or 8.80% of the agricultural area. The rest: 91.19% depends on rain water, causing that during cultivation, the problems of dry spell or wildly scattered rains are encountered, resulting in low production.

Don Chomphu Sub-district is the area of rain water agriculture, the produce received is thus uncertain, depending on rain quantity which changes every year. The agriculturists have high risk in production. The production methods ranging from using species, soil preparation, growing, caring, to harvesting, have changed from usual practices. The important produce of the sub-district is rice. Other crops have been grown in some villages, depending on area conditions, for ex: tapioca and vegetables in Mara village (Moo 3), and dry season crops growing in Baan Mueang Tee and Baan Plor Paw.

2.4.4 Livestock

Nakhon Ratchasima Province has the important animal husbandry: 70,000 milk cows, 600,000 beef cows, 60,000 buffalos, 21 million chicken, 2 million ducks, and

⁹Center for Service and Transmission of Agricultural Technology of Don Chomphu Sub-district, Non Sung District, Nakhon Ratchasima Province.

560,000 pigs. There are 180,930 farmers who raise animals, having livestock production value of 3,811 million baht. And there is production quantity of 50,637 animals, which is considered from the number of licenses issued for slaughtering animals.

Data on raising animals of Don Chomphu Sub-district, shown in Table 2.3

Table 2.3 Animal raising data of Don Chomphu Sub-district

No.	Name of villager	Cow		Buffalo		Pig	
		Cow	Agriculturist	Buffalo	Agriculturist	Pig	Agriculturist
1	Don Chomphu	47	7	-	-	77	9
2	Som	275	14	-	-	10	1
3	Mara	160	22	-	-	30	1
4	Sa Phruan	192	28	13	2	-	-
5	Don Ree	120	13	5	3	63	7
6	Mueang Tee	246	31	-	-	50	7
7	Plor Paw	269	17	-	-	57	7
8	Si Suk	110	13	45	1	20	5
9	Don Tabaeng	52	12	-	-	25	5
10	Don Chomphu Phattana	90	30	-	-	30	2
11	Jok	11	1	-	-	7	3
12	Mitrapap	-	-	-	-	7	3
13	Saen Suk	10	1	-	-	4	2
TOTAL		1,582	189	63	6	380	52

Remarks: Data derived from GorChorChor, 2 Kor BE 2550.

2.4.6 Industry¹⁰

The economics of consumption industry and employment of Nakhon Ratchasima Province in 2552 was improved, compared with the previous year. In 2552, the industrial production value was the highest: 32,145 million Baht, the second were wholesaling, retailing, motor vehicle reparation; and education which had production value = 24,774 million Baht and 13,884 million Baht respectively.

For the mineral industry of Nakhon Ratchasima Province, there are 30 mine franchisees. The expansion rate of mineral and rock granulation productions had decreased from the previous year. The important mineral and rock granulation productions were basalt, limestone, rock salt, having average total production value = 612.72 million Baht. In 2552, the highest mineral production was limestone. The production capacity of industrial rock (for construction) was 501,287 metric tons, the second was marble: 408,333.63 metric tons and basalt: 347,071 metric tons.

¹⁰Source : Nakhon Ratchasima Provincial Industry Office

There are 2,273 industrial factories (category 2 and 3), having investment funds of 205,254,781,468.66 Baht, and 124,685 workers (according to Table 2.4).

Table 2.4 Investment size of industrial factories, category 2 and category 3

Investment size	No. of Factory	Investment Amount (Baht)	No. of worker (Person)
Small size (Capital < 10 million Baht)	1,642 (73.17%)	3,694,520,955 (1.80%)	18,445 (14.79%)
Medium size (Capital 10 – 100 million Baht)	474 (20.04%)	16,309,073,497.21 (7.95%)	27,623 (22.15%)
Large size (Capital > 100 million Baht)	157 (6.79%)	177,518,158,945.76 (90.25%)	78,617 (63.06%)

Source : Nakhon Ratchasima Provincial Industrial Office

There are 3 industrial factories in Don Chomphu Sub-district. Umbrella City Factory (manufacturing umbrellas) is located in the area of Baan Si Suk at Moo 8. Plastic Recycling Factory is located at Moo 2 of Baan Som. Sap Paisan Supply Factory (assembling electrical equipment used in industrial factories, air-conditioning system, industrial tools) is located in Baan Jok (Moo 11). There are 11 oil stations and 4 gas stations as well as 12 small size mills.

2.4.7 Public utility

Don Chomphu Sub-district's every village has electricity (total 1,039 households). And every Moo has water supply (rural water supply). Ten villages have land line telephones. Every village has public phones. Mobile phones are used extensively, rendering convenient communication. There are 2 rice banks, being located at Moo 6 (Baan Mueng Tee) and Moo 8 (Baan Si Suk). There are also 2 community rice centers situated at Moo 2 (Baan Som) and Moo 3 (Baan Mara).

2.5 Value of life quality

2.5.1 Number of households and population¹¹

Don Chomphu Sub-district has total population of 7,744: 48.49% male and 51.51% female. There are 1,893 households, having average population of 4.09 person per household, and density = 191 persons per square kilometer.

Buddhism is the people's main religion. There are merit-making traditions according to the religion performed in various months, which have continuously carried on. Their livelihood is kindred-type, committing to and depending on each other. They respect Buddhist monks, seniors, and community leaders, etc.

¹¹ <http://www.donchompoo.go.th/index.php>

2.5.2 Economic situation

The Don Chomphu Sub-district's economic situation data is derived from the study on secondary data, and related documents and reports, resulting in the following study results:

Vocation: rice farming, tapioca plantation, growing vegetables, raising animals. There are agricultural households about 64% of total households. Agricultural area is averagely 18 rai per household. Average agricultural workforce is 2 persons per household. In 2549, the income was over the primary necessity level 1, every household having average income of 20,000 Baht per person per year.

Land tenancy The agriculturists having their own land are about 90% of total households. They have title deeds and NorSor3 documents. The rights to land tenancy details are derived from GorChorChor 2 Kor BE. 2546. Almost of Don Chomphu Sub-district areas which are owned by agriculturists (land tenancy) are in the form of NorSor3 documents (no SorPorGor or reserved forest area). In Baan Mara (Moo 3), total area with no title documents = 219 rai (which is the area of growing crops). Average in-season rice production is 346 kilograms per rai, and average tapioca production is 2,933 kilograms per rai. In-season rice production cost is 2,350 Baht per rai while tapioca production cost is 2,620 Baht per rai.

Agriculture Agricultural area is 20,873 rai, being farmland 20,432 rai or 98% of total agricultural area. Average area for each household = 16.8 rai. The agriculturists in Baan Saen Suk (Moo 13) have the most average land area tenancy = 25.7 rai per family. For Baan Don Chomphu Phattana (Moo 10), the agriculturists have the least average land area tenancy = 11.4 rai per family. Other agricultural areas are crops. The area for growing tapioca is 280 rai (most tapioca growing area is in Baan Mara (Moo 3) which is public area). The agriculturists will grow vegetables in the area of water source (for consumption) and the surplus will be sold, for ex: in Baan Mara (Moo 3), vegetables are grown in the area of Bung Mara. Villagers in Baan Mueang Tee (Moo 6) and Baan Plor Paw (Moo 7) will grow vegetables (ex: chili, sweet corn, cucumber) in dry season on the banks of Moon River.

Labor At present, in Don Chomphu Sub-district, the use of agricultural machines has been increasing in agricultural production. Paddy-sown fields are preferred for growing rice, which labor and time for operation is highly decreased. In the agricultural sector, the elderly labor is mainly used. The young people will travel to work in the industrial sector in the district and other districts, in the province and other provinces, and in Bangkok. Women will work in the dressmaking factories (for ex: sportswear, underwear) or work in the field of electronic components assembling. While men work in the field of furniture, sanitary ware, cement and construction, etc. The average labor in the sub-district is 2.3 persons per family. In Baan Don Chomphu (Moo 1), the average force is 1.3 persons per family (which is the lowest). In Baan Saen Suk (Moo 13), the average force is 2.9 persons per family (which is the highest).

2.5.3 Social situation

Education

Nowadays, the people in Don Chomphu Sub-district prefer to send their children to further study after finishing compulsory education in the village. The children will be sent to study in the district schools, for ex: Si Suk Vithaya School. Some send their kids to study in the Mueang District area. Moreover, they will send their

offspring to study at the university level, within Nakhon Ratchasima Province, in other provinces, and in Bangkok.

Don Chomphu Sub-district has 4 primary schools, located at Moo 1, 2, 7, and 8; has 2 high schools, located at Moo 1 (which is opportunity-expanding school) and at Moo 8. There is a center for young children situated in Baan Sa Phruan (Moo 4).

Religion

The people in Don Chomphu Sub-district are Buddhists. There are altogether 7 Buddhist temples located at Moo 1 (which the people at Moo 1, 9, 10, and 12, will jointly make merits), Moo 5 (jointly making merits with the villagers from Moo 11), Moo 6 (with the villagers from Moo 7), and Moo 8 (with the villagers from Moo 13). Besides, there are other temples located at Moo 2, 3, and 4.

Culture

The language used by the people in Don Chomphu Sub-district is Thai Korat (spoken language). The people are Buddhists, daily making merits and giving food to the Buddhist monks. On Buddhist Sabbath days, they will offer food to the monks and listen to sermons at the temples. These are practiced also on the religion's holy days and the nation's important days. In the past, they had various kinds of beliefs, however, at present, these beliefs have disappeared and some that are left, the decreasing in practice is apparent. However, there are some beliefs which are regularly observed:

The plowing ceremony It is the ceremony of informing local gods of the land, which will fall on the same day as the nation's Royal Plowing Ceremony's (which falls on Thursday). The agriculturists will also plow and transplant rice seedlings for the first time on Thursday.

Rice encouragement ceremony It is the ceremony of worshipping the rice goddess, and is conducted on the 3rd day of waxing moon of the 3rd month. After harvesting rice and keeping rice grains in the barn, the agriculturists will not bring them out of the barn until the said date, believing that they will have rice grains being kept in the barn every year.

2.5.4 Public health¹²

There is a Sub-district Public Health Center. The center is located close to the national highway (Mitrapap Road), between the 33rd Kilometer and Nakhon Ratchasima Province. It occupies the area of 1 rai and 32 square wah and has altogether 9 staffs.

¹² <http://www.dchealth.ob.tc/Gen.htm>