

The design of a large groundwater supply system and water distribution system in Sakae Raj Subdistrict, Pak Thongchai District, Nakhon Ratchasima Province

Introduction

The Bureau of Groundwater Resources, Region 5 (Nakhon Ratchasima) is implementing a project titled "The Investigation of High Potential Groundwater for Strengthening Water Security in Sakae Raj Subdistrict, Pak Thongchai District, Nakhon Ratchasima Province (Phase I)." According to the study, Khok Sakae Raj village 3 has a high groundwater potential, and four production wells with a groundwater yield of more than 40 m³/hour were developed. Additionally, it was an artesian and freshwater aquifer. Therefore, they were sufficient for supplying the population's needs at a production rate of 1000 m³/day with a pumping rate of 25 m³/hour to avoid exceeding groundwater extraction. Also, a large groundwater supply system, water distribution system, and drinking water service point were designed in preparation for Phase II construction.

Methodology and Result

1. Surveying the area and elevation for a large groundwater supply system, the village's original water supply, and groundwater distribution pipe. The result found that the area is flat and hilly.

2. Calculate and design a large groundwater distribution and supply system.

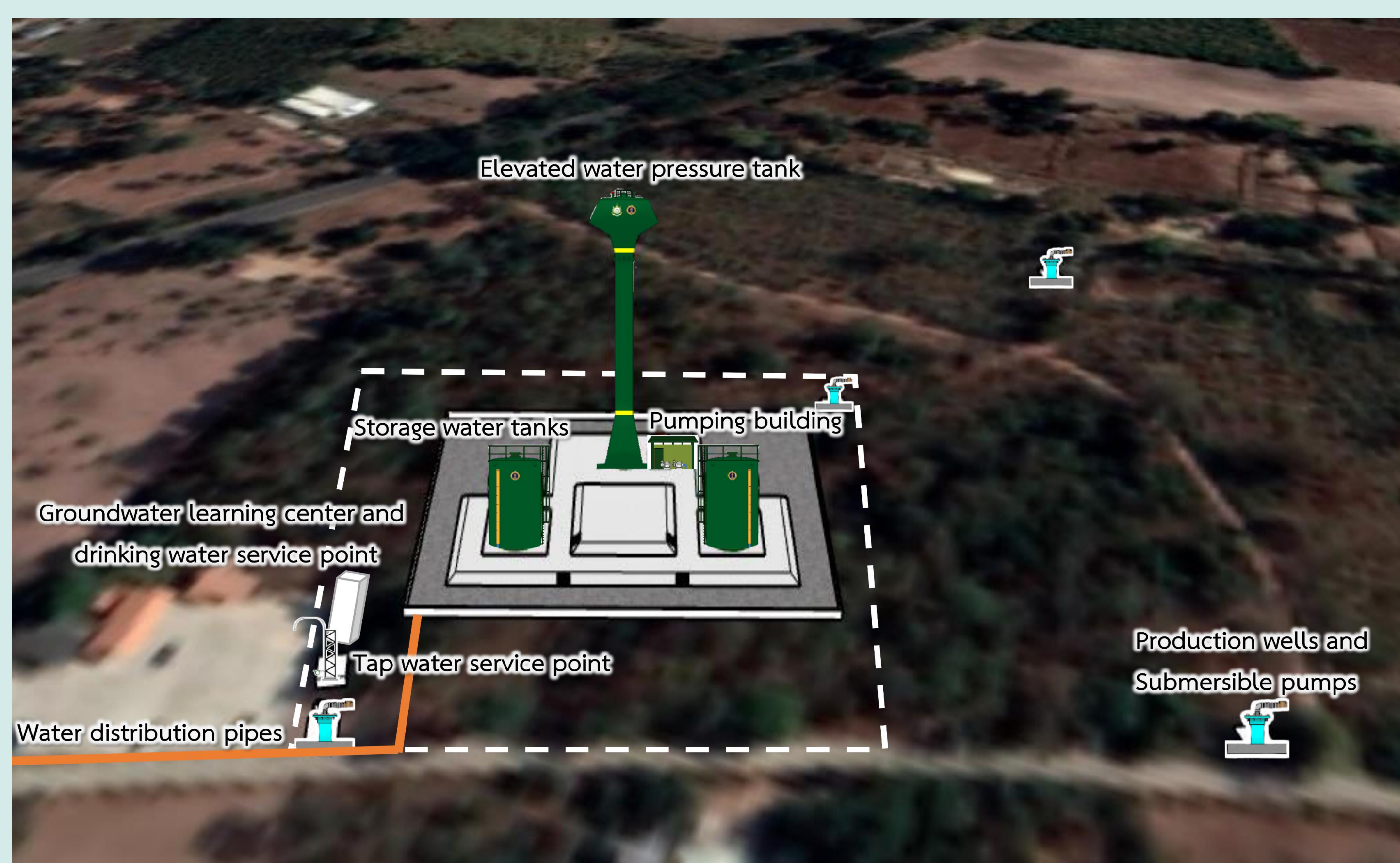
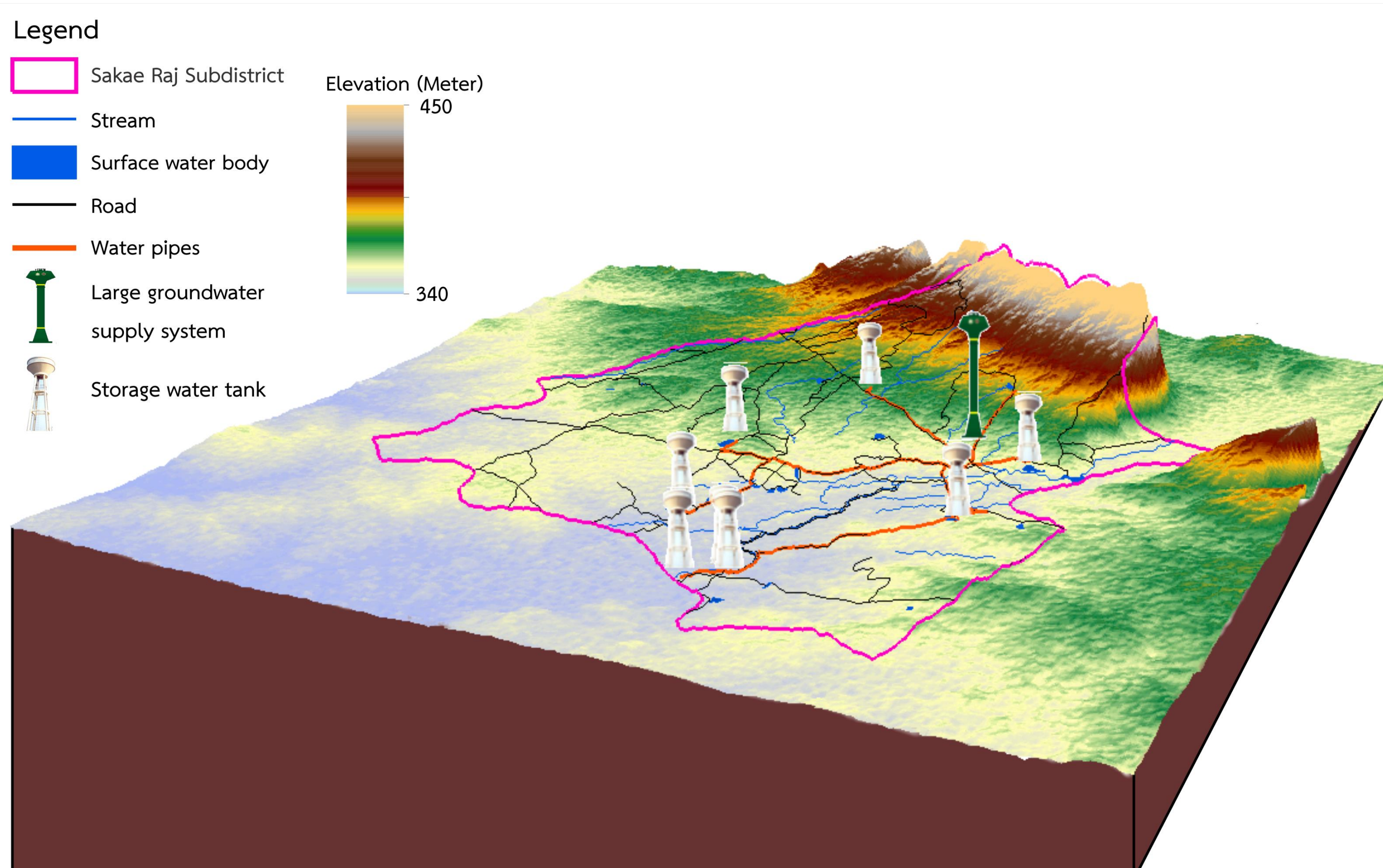
Objective : Population water demand volume of 1,000 m³/day

- Four production wells were installed with submersible pumps with 7.5 horsepower. These pumps can pump water at least 1600 m³/day, which will fill the water tank in 30 hours.

- Two 750 m³ capacity steel water storage tanks, for a total capacity of 1,500 m³, to provide sufficient drinking water to fulfill the current and future water needs of the developing community's population.

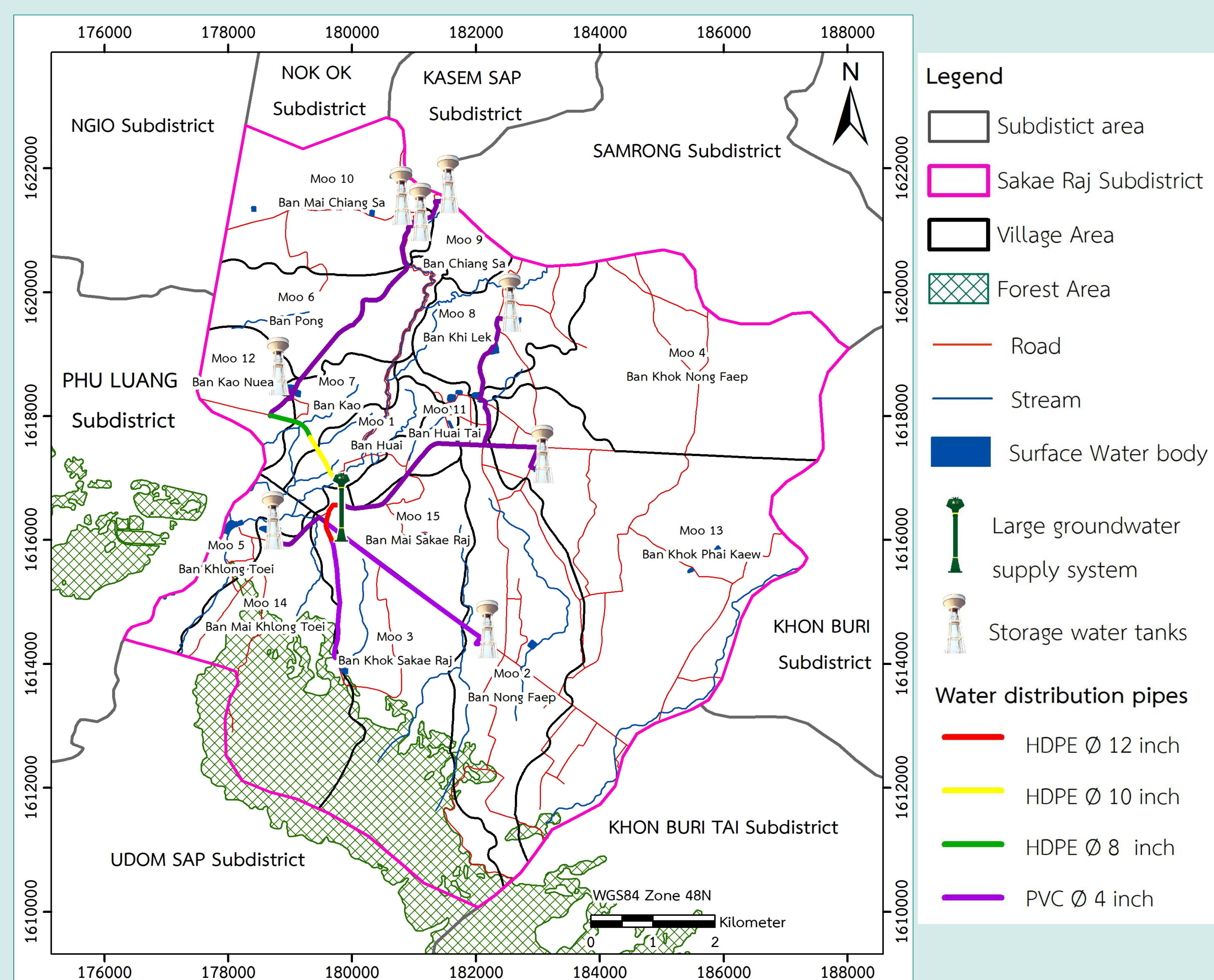
- A 300 m³ capacity pressure-maintained steel water tower can distribute water at least 30 kilometers.

- Design a 3 km water distribution system and calculate its maximum water pressure and pressure loss in the pipe due to friction by requiring pipe size reductions proportional to distance to maintain the pressure needed to deliver water to the entire district.



A large groundwater supply system consists of

1. Production well Ø 6 inch : 4 wells
2. Submersible pumps with a specification of 7.5 horsepower in 4 wells
3. Storage water tank with a 750 m³ capacity : 2 tanks
4. Pumping building : vertical multistage types of 20 horsepower 2 pumps
5. Elevated water pressure tank type of 300 m³ capacity
6. Tap water service point
7. Groundwater learning center and drinking water service point
8. Water distribution pipes line 3000 meters
 - High-Density Polyethylene (HDPE) Ø 12 inch 1,000 meters
 - High-Density Polyethylene (HDPE) Ø 10 inch 1,000 meters
 - High-Density Polyethylene (HDPE) Ø 8 inch 1,000 meters



Discussion and conclusion

When in actual use, the water pressure in the pipe may drop more than the calculated amount. which requires tracking of usage to provide information to improve the water distribution system.