

The Investigation of High Potential  
Groundwater for Strengthening Water  
Security in Sakae Raj Subdistrict,  
Pakthongchai District,  
Nakhon Ratchasima Province

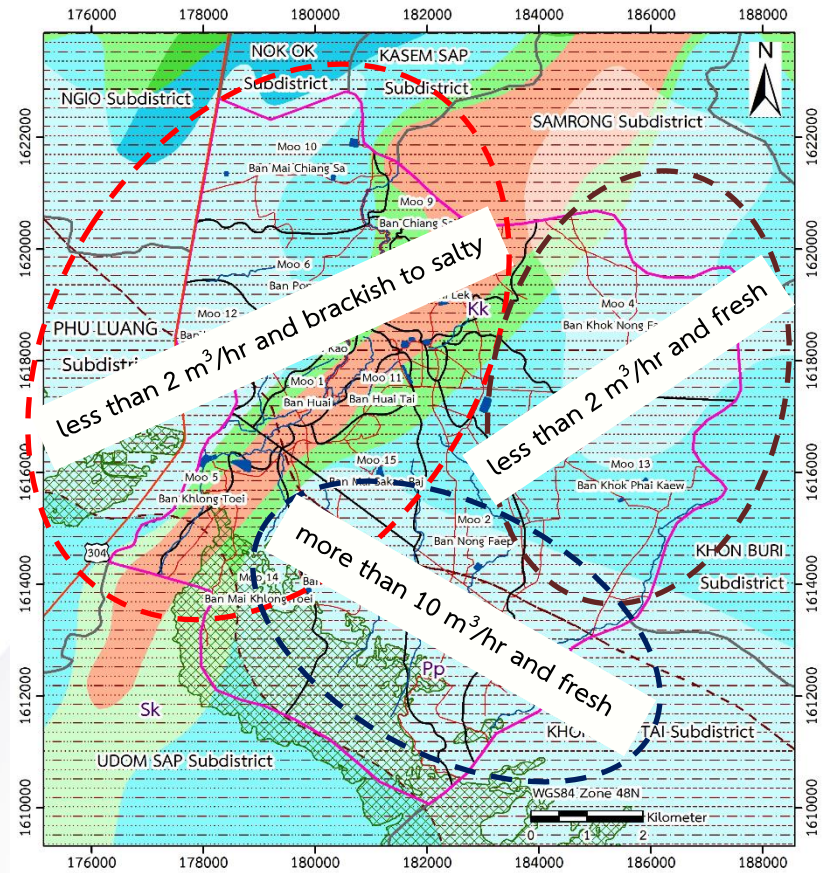
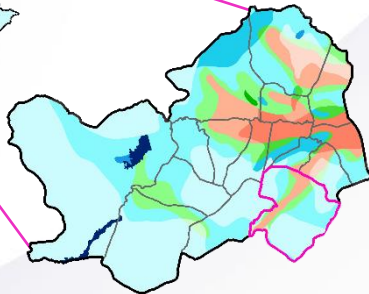
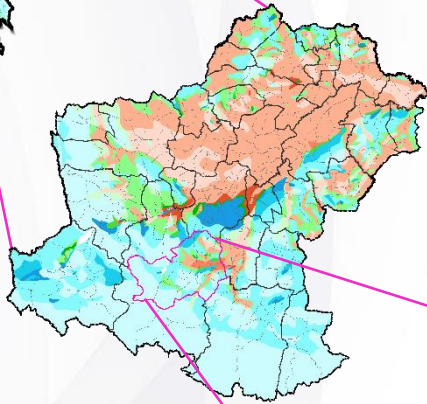
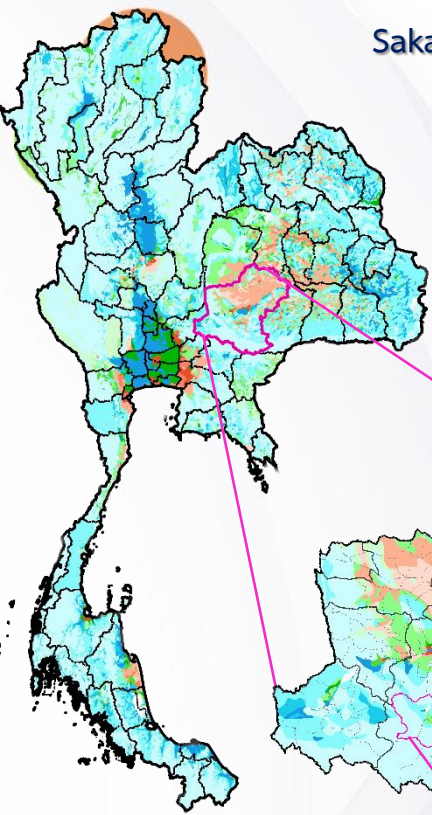


The Bureau of Groundwater Resources Region 5 (Nakhon Ratchasima)  
Department of Groundwater Resources, Ministry of Natural Resources Environment

# Sakae Raj Subdistrict, Pakhongchai District, Nakhon Ratchasima Province

- Area : 60 square kilometers
- 15 Village, population about 8,500 people
- Topography : Hilly and plain terrain dominates. The south is mountainous.
- Problem : Water shortage during March-July

- Groundwater yield :  
It is mostly less than 2 m<sup>3</sup>/hr in the northern part of the subdistrict and brackish to salt water dominates near the Chiang Sa stream.



### Legend

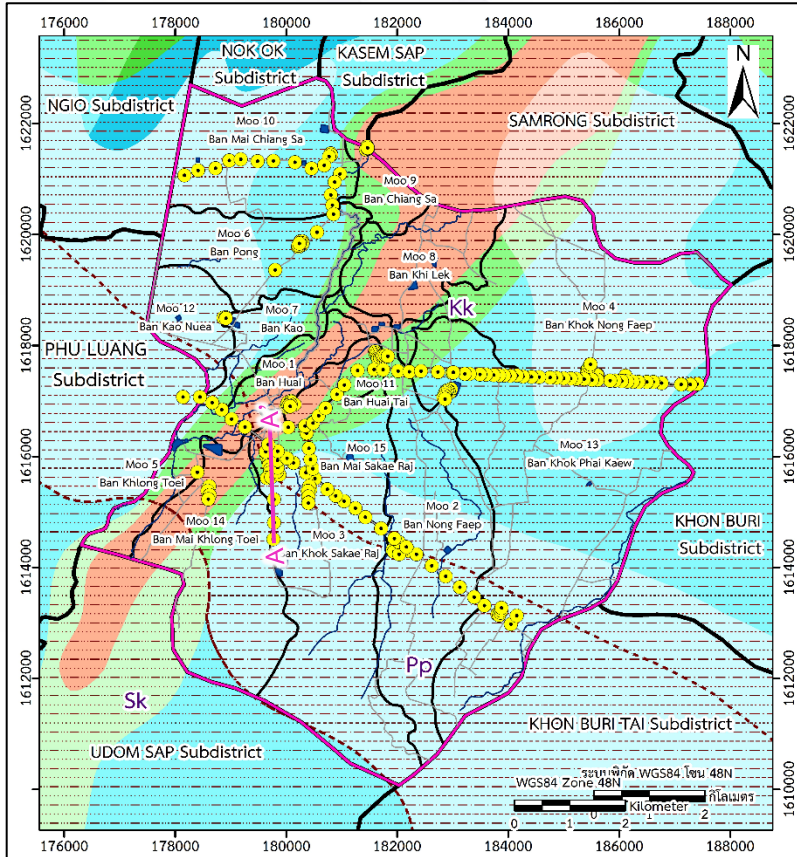
- Subdistrict area
  - Sakae Raj Subdistrict
  - Village Area
  - Forest Area
  - Road
  - Stream
  - Surface Water body
- ### Hydrogeological Units
- Kk : Khok Kruat Aquifer
  - Pp : Phu Phan Aquifer
  - Sk : Sao Khua Aquifer

### Groundwater Availability Index

Groundwater Quality Total Dissolved Solids (TDS) (mg/lgram/liter)	Expected Well Yield (cubic meter/hour)			
	< 2	2-10	10-20	> 20
< 500	Light Blue	Blue	Dark Blue	Green
500-1,500	Light Green	Green	Dark Green	Blue
> 1,500	Light Blue	Blue	Dark Blue	Green



# Results of Geophysical Survey



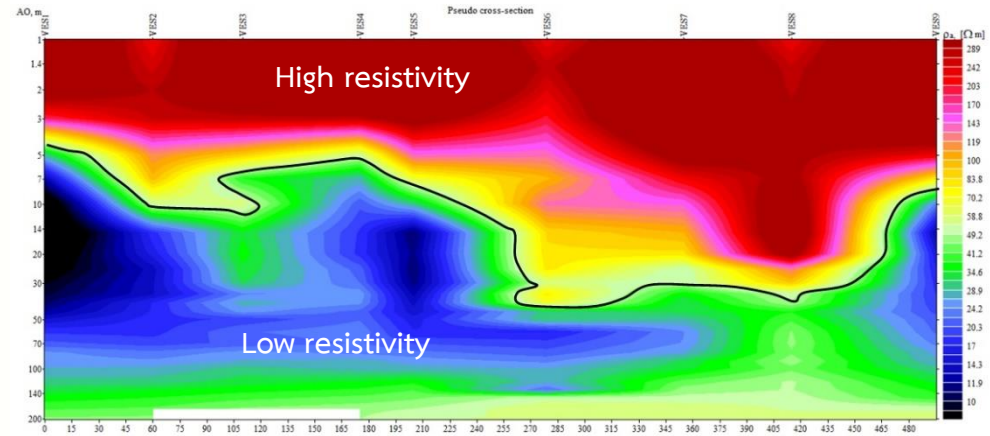
## Legend

- Subdistrict area
  - Sakae Raj Subdistrict
  - Village Area
  - Forest Area
  - Road
  - Stream
  - Surface Water body
  - Geophysical survey (Vertical electrical sounding)
- ### Hydrogeological Units
- Kk : Khok Kruat Aquifer
  - Pp : Phu Phan Aquifer
  - Sk : Sao Khua Aquifer

## Groundwater Availability Index

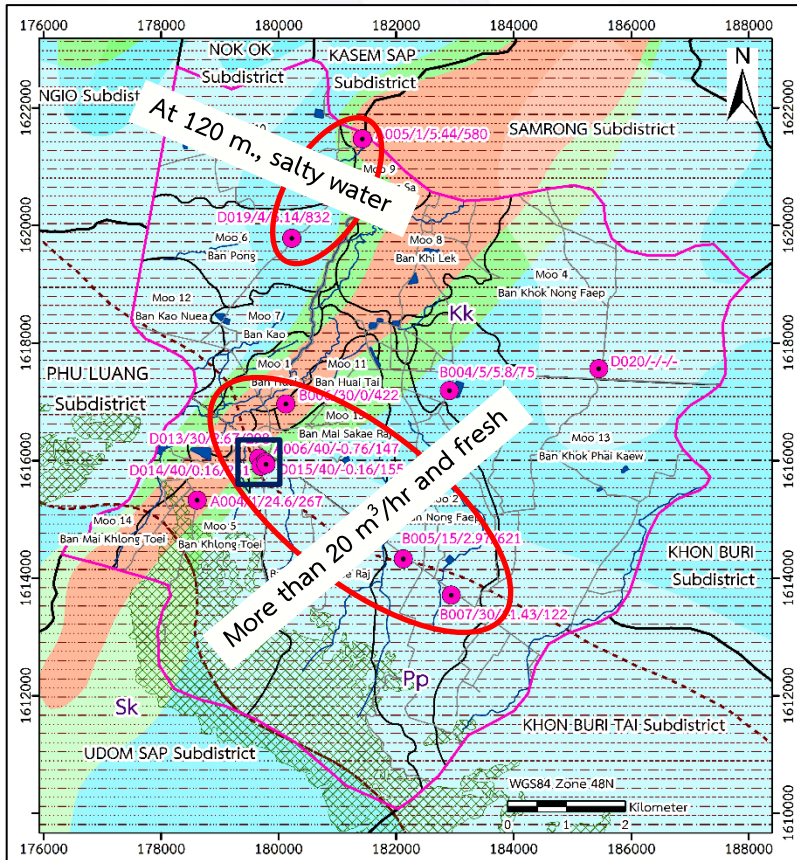
Groundwater Quality Total Dissolved Solids (TDS) (milligram/liter)	Expected Well Yield (cubic meter/hour)			
	< 2	2-10	10-20	>20
< 500	Light Blue	Blue	Dark Blue	Very Dark Blue
500-1,500	Light Green	Green	Dark Green	Very Dark Green
>1,500	Light Orange	Orange	Dark Orange	Very Dark Orange

- Extensive 209-point geophysical survey processed with IPI2WIN.
- Determine the drilling locations for 12 exploration wells.



Resistivity cross section line A-A'

# Drilling Results



## Legend

- Subdistrict area
- Sakae Raj Subdistrict
- Village Area
- Forest Area
- Road
- Stream
- Surface Water body
- Exploration well (Well number/Yield/SWL/TDS)

## Hydrogeological Units

- Kk : Khok Kruat Aquifer
- Pp : Phu Phan Aquifer
- Sk : Sao Khua Aquifer

## Groundwater Availability Index

Groundwater Quality Total Dissolved Solids (TDS) (milligram/liter)	Expected Well Yield (cubic meter/hour)			
	< 2	2-10	10-20	>20
< 500				
500-1,500				
>1,500				

In the project area, 12 exploratory wells were drilled along with geophysical investigations of boreholes and preliminary groundwater measurements.

- Exploration drilling wells were found the groundwater in the Phu Phan aquifer. The groundwater yield is more than 20 m<sup>3</sup>/hr and in some areas it is found artesian wells.

- Exploration wells discovered groundwater in the Khok Kruat aquifer with a groundwater yield about 1-5 m<sup>3</sup>/hr. Two saline groundwater wells were identified and one well was dried.

Based on the survey results, the target area for drilling production wells is at **Ban Khok Sakaeraj, Village No. 3**

# Activities of Geophysical Survey and Drilling



Geophysical survey



Drilling and yield measuring



Groundwater sampling and testing



Lithologic logging



Well logging

# Results of Groundwater Drilling and Well Development

## Results of Pumping Test

### Ban Khok Sakae Raj

Moo 3, Sakae Raj Subdistrict, Pakthongchai District, Nakhon Ratchasima Province



No.	Well number	Coordinates			Depth (m)	SWL (m)	Safe Yield (m <sup>3</sup> /hr)	Note
		Zone	UTM_E	UTM_N				
1	6405D016	48P	179658	1616040	150	0.46	25	Production well
2	6405D017	48P	179691	1615901	150	0.79	25	Production well
3	6405A007	48P	179839	1615944	150	0.70	25	Production well
4	6405D018	48P	179777	1615969	150	0.50	25	Production well
5	6405A008	48P	179785	1615931	150	0.27	25	Observation well

#### Groundwater Quality

Water quality satisfies groundwater consumption standards\*.

\*Notification of the Ministry of Natural Resources and Environment, B.E.2551 (2008) in issued under the Groundwater Act, B.E. 2520 (1997) which was Published in Royal Government Gazette, Vol.125, Special Part 85D dated May 21, B.E.2551 (2008)

# Activities of Groundwater Drilling and Well Development

## Activities of Pumping Test



### Ban Khok Sakae Raj

Moo 3, Sakae Raj Subdistrict, Pakthongchai District, Nakhon Ratchasima Province

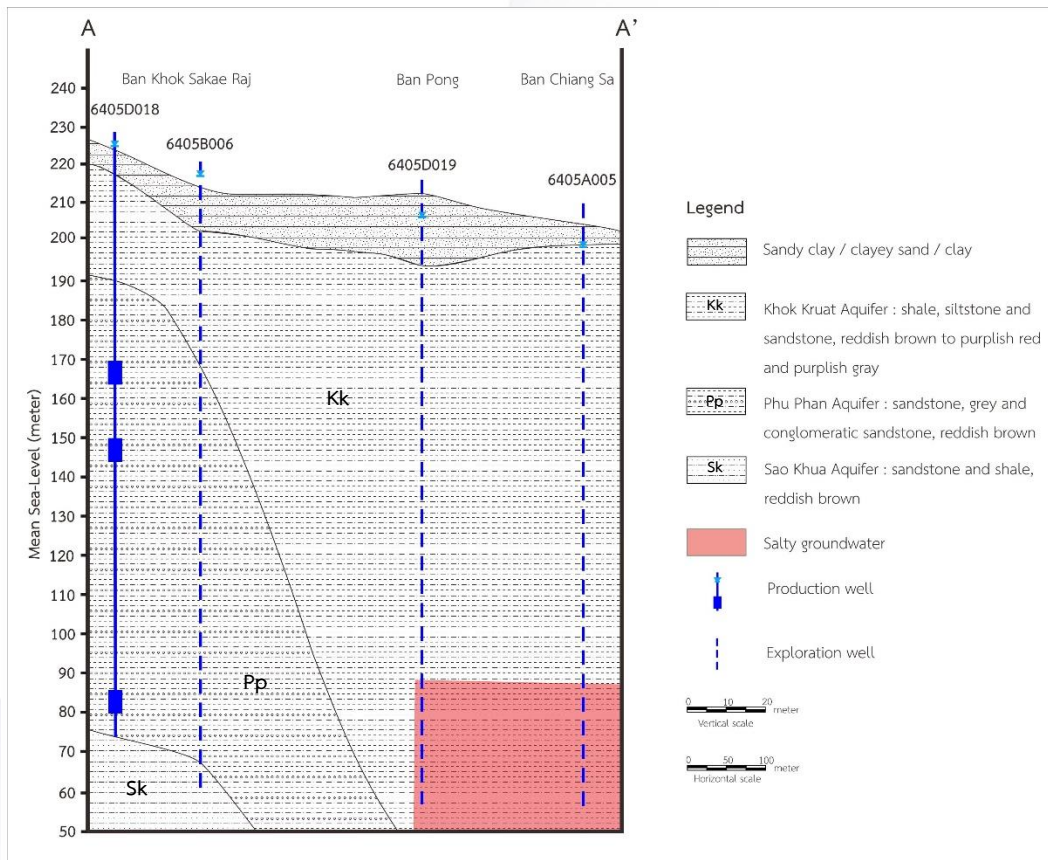
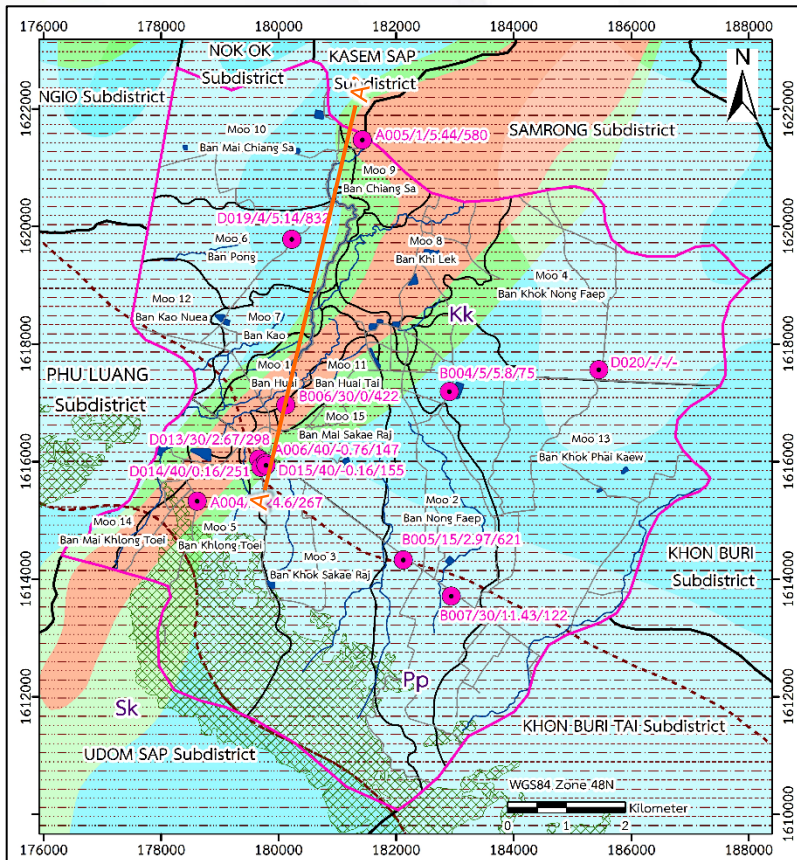


Drilling and develop groundwater wells



Pumping test

# Geological cross section line A-A'

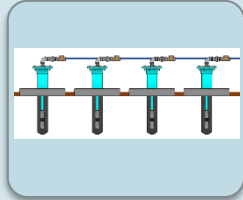




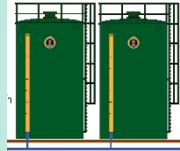
# Investigation and Design of Large Groundwater Supply System



Conducting engineering surveys and designing large groundwater supply systems in order to have a production rate sufficient to meet the people's water needs of  $1,000 \text{ m}^3/\text{day}$  and set the pumping rate per well at  $25 \text{ m}^3/\text{hr}$  in order not to affect the aquifer. The system consists of



Production wells  
4 wells and  
submersible  
pumps with a  
specification of  
7.5 horsepower



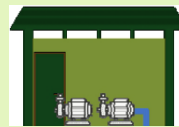
Storage water  
tanks ( $750 \text{ m}^3$   
capacity)  
2 tanks



Elevated water  
pressure tank  
type of  $300 \text{ m}^3$   
capacity 1 tank



Tap water  
service point



Pumping building  
and vertical  
multistage  
types of  
20 horsepower  
2 pumps



Groundwater  
learning center  
and drinking  
water service  
point

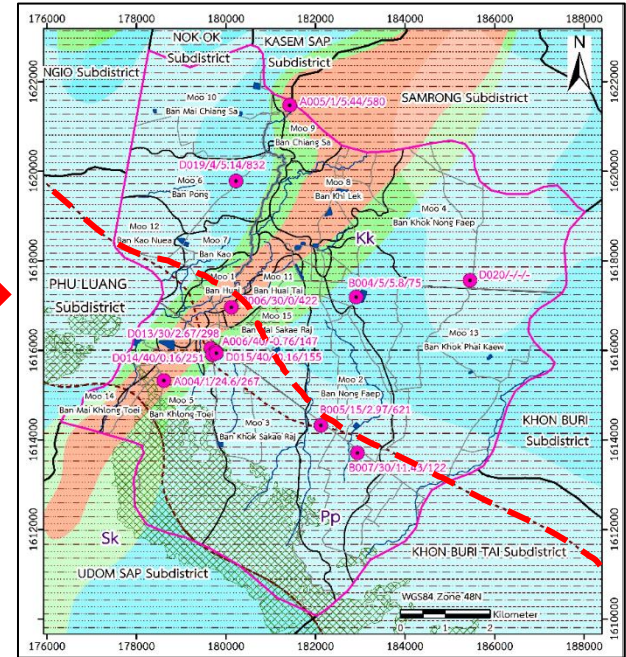
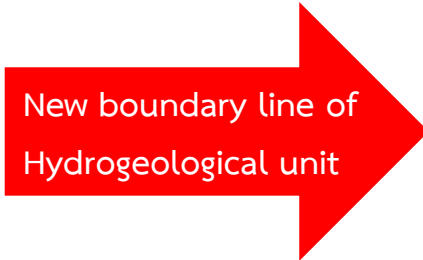
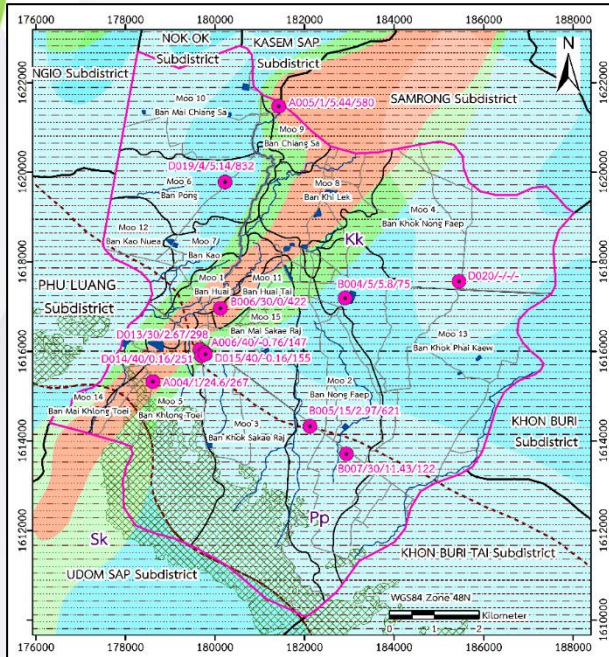


Water  
distribution pipes  
3 kilometers

# Conclusions



1. The data obtained from the study can be used to improve the hydrogeological and groundwater maps in Sakaeraj Subdistrict, Pak Thong Chai District, Nakhon Ratchasima Province.
2. The establishment of groundwater conservation areas is necessary to prevent future groundwater contamination.



# Q & A

Thank you for your kind attention.