Optimum Spacing of Extraction Wells

Project area in Srikaew subdistric, Sisaket province

The pumping test is the standard technique for estimating various hydraulic properties of aquifer systems and observing its drawdown response in one or more wells. The optimum pumped well spacing is an important factor to consider well placing far enough apart. To prevent well interference, as a result of one of depression from two separate pumping wells grows large enough to overlap. The spacing can be obtained from estimating hydraulic properties and cone of depression.

Objectives

1. To determine the suitable spacing of groundwater well.
2. To understand the behavior of aquifer system and drawdown response.
3. To prevent well interference and sustainable water management.

Methods

1. Choose the groundwater wells to represent the area's groundwater potential. In this study choose 3 wells with a diameter of 6 inches, depth of wells 30 meters, aquifer depth from 18 to 28 meters, and discharge rate about 11 cubic meters per hour.
2. Pumping test in each well with the constant rate for a period of 10 hours or until the water level stabilizes. Record the data for every hour, water level, discharge rate and water quality, both of pumping and observation wells.
3. Analyze the data to estimate the hydraulic properties and cone of depression in each wells by AquiferTest version,2016.1 program, using Theis and Cooper & Jacob analysis method. After that, determine the proper pumped well spacing.
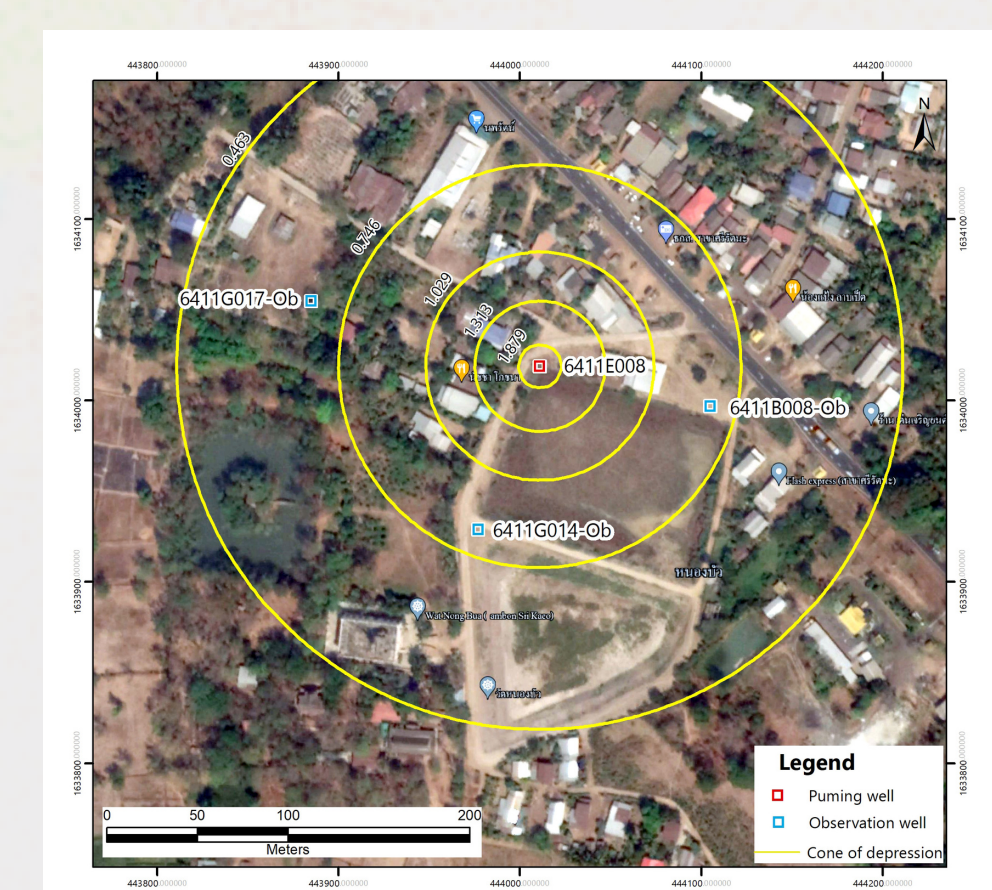
Results

No.	Wells Number	UTME	UTMN	Depth (m)	Discharge Rate (m^3/hr)	Staticwater Level (m)	Drawdown (m)
1	6411B007	444245	1633737	30	11.00	16.66	7.29
2	6411E007	443856	1633864	30	11.50	15.59	5.41
3	6411E008	444011	1634019	30	11.50	17.72	3.70
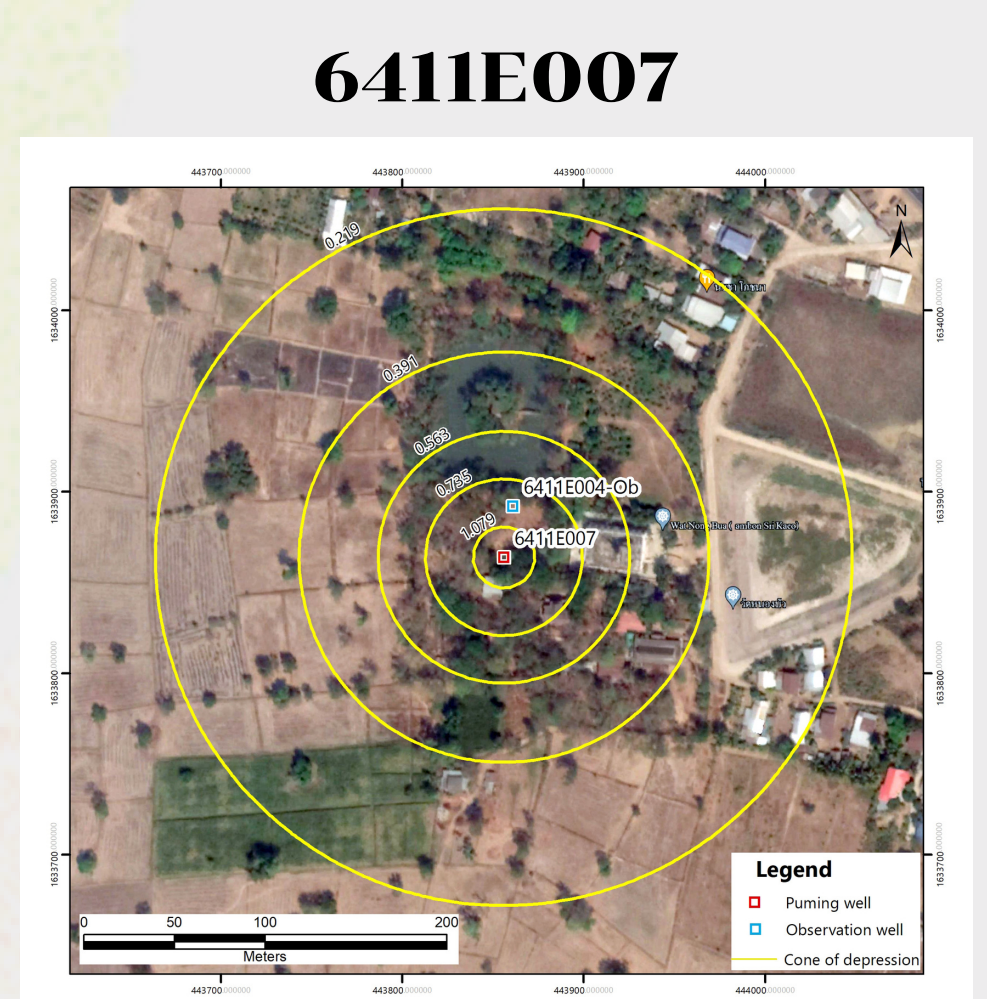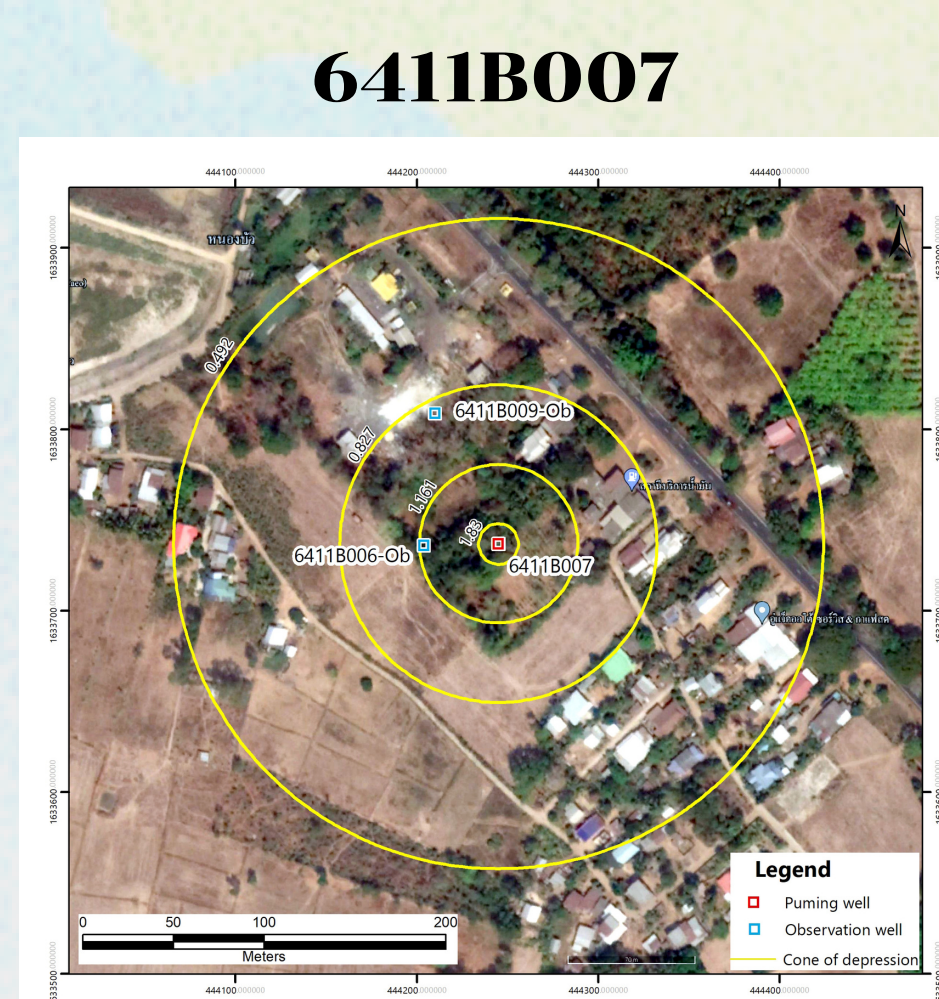
No.	Wells Number	Hydraulic properties									*Safety spacing (m)
		Theis method			Cooper-Jacob method			Average			
		$T (m^2/day)$	$K (m^2/day)$	S	$T (m^2/day)$	$K (m^2/day)$	S	$T (m^2/day)$	$K (m^2/day)$	S	
1	6411B007	1.28×10^2	2.13×10	1.26×10^{-3}	1.93×10^2	3.22×10	6.23×10^{-4}	1.60×10^2	2.675×10	9.42×10^{-4}	45
2	6411E007	1.19×10^2	1.98×10	3.13×10^{-4}	1.28×10^2	2.14×10	2.27×10^{-4}	1.24×10^2	2.06×10	2.70×10^{-4}	17
3	6411E008	5.85×10^2	9.75×10	1.10×10^{-4}	4.69×10^2	7.82×10	1.45×10^{-4}	5.27×10^2	8.785×10	1.28×10^{-4}	63

Safety spacing was set of acceptable at drawdown less 1 meter

6411B007

6411E007

6411E008

Conclusions

The optimum spacing of extraction wells are is in the range from 17 to 63 meters, average at 42 meters. A distance of each pumped well should be set with the spacing at least 42 meters. To prevent well interference and sustainable water management.