CHAPTER V
DISCUSSION

5.1 Groundwater type

Results of groundwater type in unconfined aquifer were calcium-bicarbonate, sodium-chloride and mixed types. In dry season, the south-western of landfill are mixed type and has been changed into sodium-chloride type on dry season (Figures 5.1 and 5.2). This implies that the hydrochemical facies is controlled by geochemical process in aquifers. According to Nguyen et al. (2013) study, they used the piper diagram method to determine the hydrochemical facies of groundwater in confined and unconfined aquifers in Hanoi, Vietnam. Also, piper diagram was conducted to classify the groundwater type in this study. The results reported that most groundwater type in confined aquifer remain unchanged but groundwater type was changed in unconfined aquifer depending on seasonal variations.

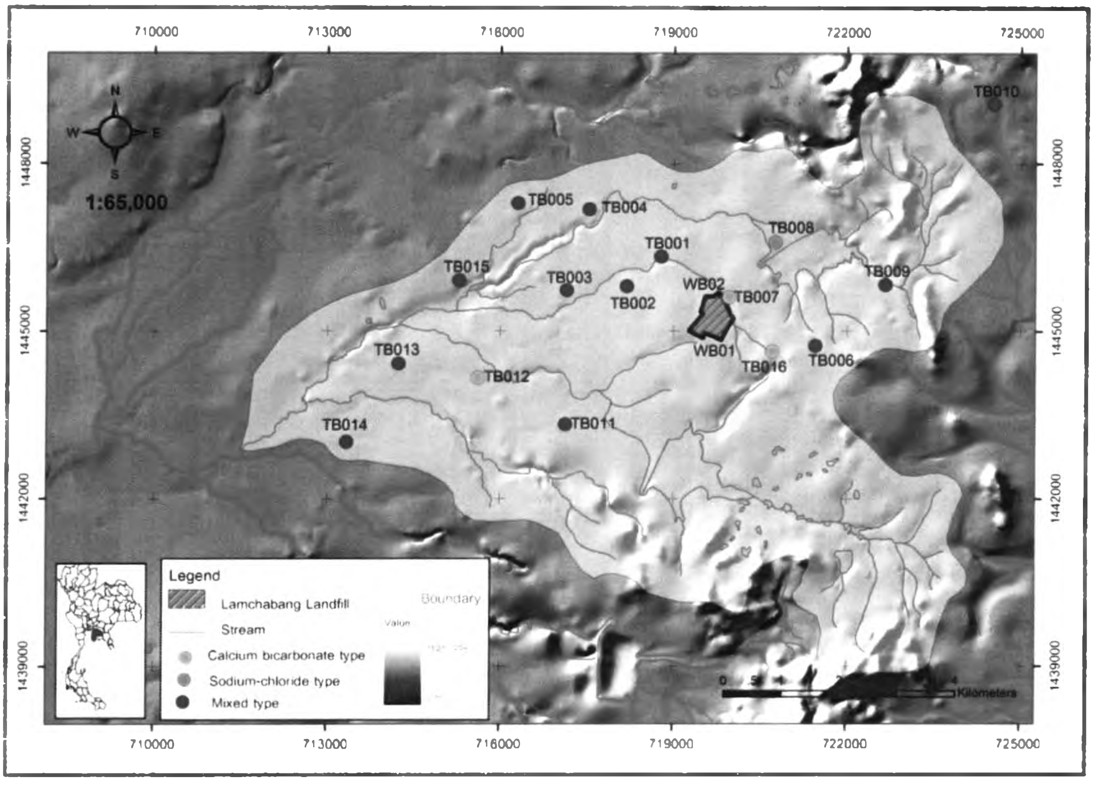

Figure 5.1 Map of groundwater type in dry season

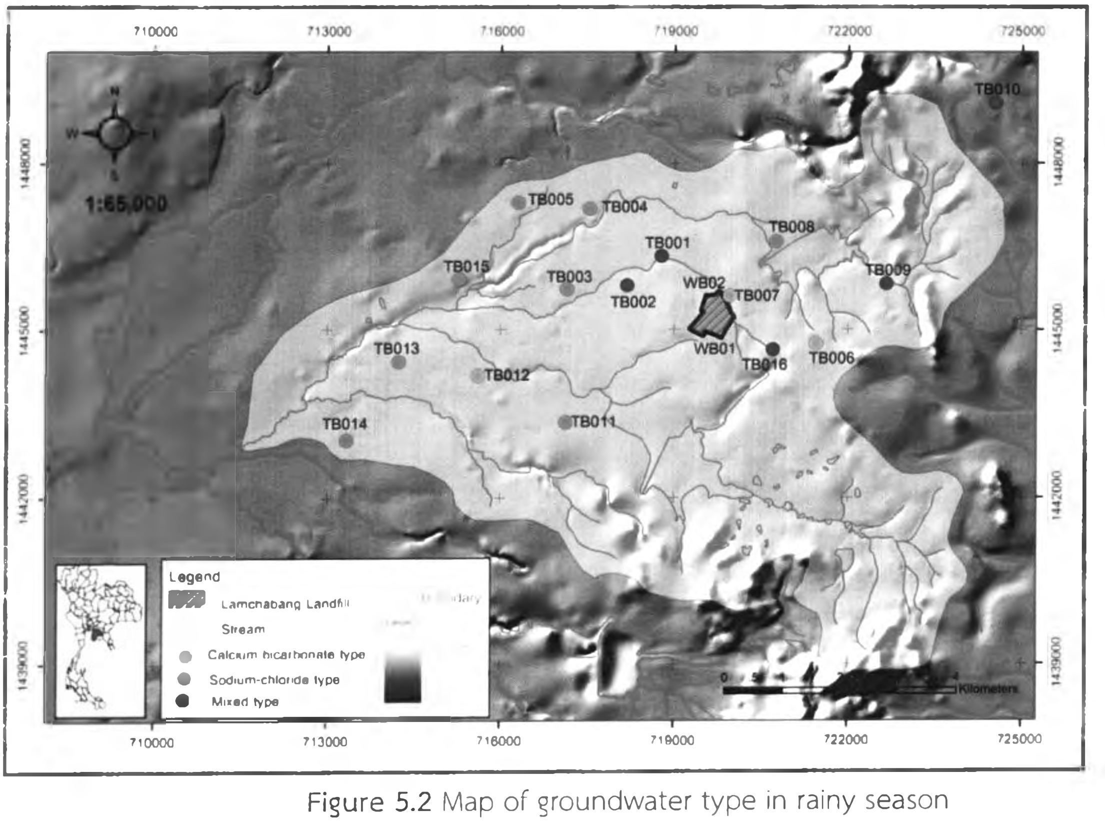

Figure 5.2 Map of groundwater type in rainy season

5.2 Arsenic species

The pH values of this study were broad range from acidic to basic condition, ranged from 4.84 to 7.60. The data plotting of pH and Eh diagram are still in $H_2AsO_4^-$ and $HAsO_4^{2-}$ region, depending on Eh, which can indicate that the groundwater samples are As^{+5} species dominance. According to the study of Ryu et al. (2002) used the Eh-pH phase diagram to predict arsenic speciations in the shallow groundwater of Owens Lake for the pH ranges 9.4±0.3. The results showed As in water mainly was arsenate (As+5) and was stable in $HAsO_4^{-2}$, H_3AsO_3 and $H_2AsO_3^-$ regions.

5.3 Arsenic transports

The result of this study found that the sorption was different depending on the soil types (sand and sandy loam). Similarly, the column experiment was used to describe the sorption of As in soil (Tan, 2006). In this study was found that pH values are acidic condition, which calcium and magnesium are basic cations, as their amounts increase, the relative amount of acidic cations will decrease (Brady, 1990). The cation exchange capacity (CEC) is a measure of the soil's ability to hold positively charged ions (Hazleton and Murphy, 2007). The clay and organic matter (OM) have a large quantity of negative charges which can absorb and hold the cations (McKenzie et al., 2004). Therefore, the higher of clay and organic matter contents should be the higher of CEC. Also the pH value increase, the number of negative charges on aquifer medias increase, thereby the value of CEC increase. Regarding PZC, when pH of soil is above its PZC, the soil surface will have a net negative charge and predominantly exhibit to exchange cations, while the soil will mainly retain anion when its pH is below its PZC (Morais, 1976; Parks, 1961). In this study, the results of soil chemical properties were correlated with the potential of soil sorption, which can imply that sandy loam has better potential sorption capacity than that of sand.

Modeling reviewed that As migrate from the landfill site to the river, located downstream in the north-west direction, due to the local flow effect and would not extended farther than 1,500 m with low As concentration (not over than the groundwater standard of < 0.01 mg/L). According to the study of Radloff et al., 2012, the MODFLOW was conducted to identify the regions of the Bengal Basin at risk of contamination and using MT3DMS to determine As sorption. The result was found that As concentration was reduced to 70% due to the sorption However, modeling indicated that some areas remain vulnerable.