

THAILAND GROUNDWATER BANKING CONCEPT

BY AGS AMERICAN GROUNDWATER SOLUTIONS, LLC

English version 1.1/2019
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Thailand Groundwater bank concepts focus on the use and managing of groundwater supply in a complete system where local government and local citizens can participate. The concept also aims to help community and local government to become more self efficient in term of managing their own freshwater supply.

LOCAL GOVERNMENT PART:

- Responsible for managing and monitoring groundwater in their areas including promoting and educating the population to have basic knowledge of watershed protection and their roles and impact to the environment specially Freshwater supply and groundwater supply.
- Find solutions to fix the groundwater shortage problem in a large scale. For example, a groundwater recharge project helps to replenish the aquifers and keep up with the demand of the groundwater usage in the area. The project must meet with the minimum requirements regulation of water quality from Department of Groundwater to prevent the aquifer from contamination.
- Keep track of the usage of groundwater in the area to balance with the nature and Artificial recharge charging rate.
- Designate and regulate the use of Groundwater.
- Encourage and support the population to use dry wells (closed system in Groundwater bank term). Set up education programs and supply the materials to built the dry wells.

LOCALS CITIZEN PART:

- Learn basic knowledge of their roles in the environment such as the important of watershed protection which will help prevent the contamination to freshwater supply reservoir, groundwater, and the environment.
- Encourage the citizen to use dry wells (Closed system in Groundwater Bank's term) in their properties to reduce the amount of the run off during

the raining period. This will help the local municipal dramatically in term of managing flood water.

- Insert the knowledge of watershed protection to the textbook in school. This will help cultivate the children in the early stage to have the right understanding and become a role model for next generation for the better future.

GROUNDWATER RECHARGE PROJECT STANDARDS SPECIFICATION

MUNICIPAL ARTIFICIAL RECHARGE PROJECT (OPEN SYSTEM IN GROUNDWATER BANK TERM)

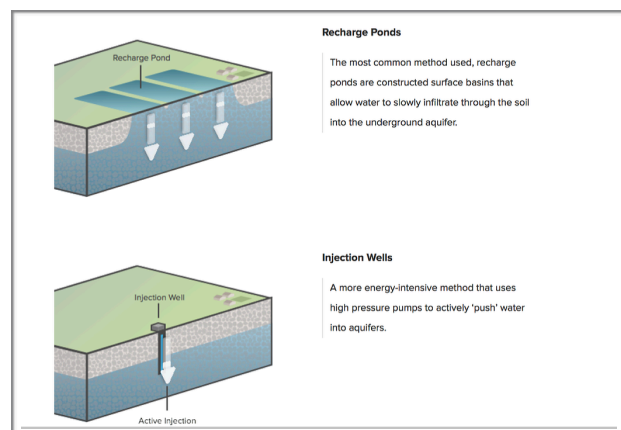
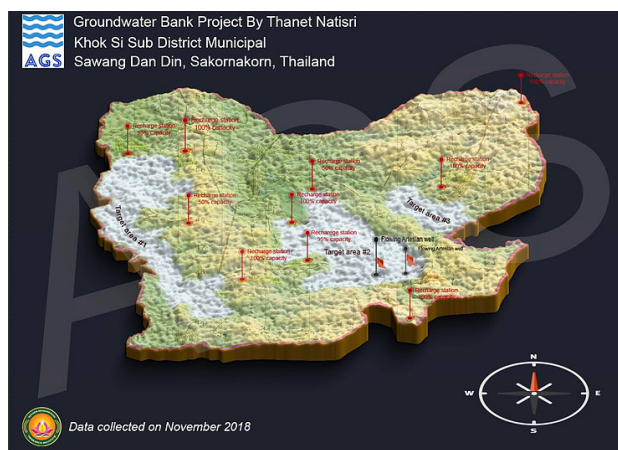
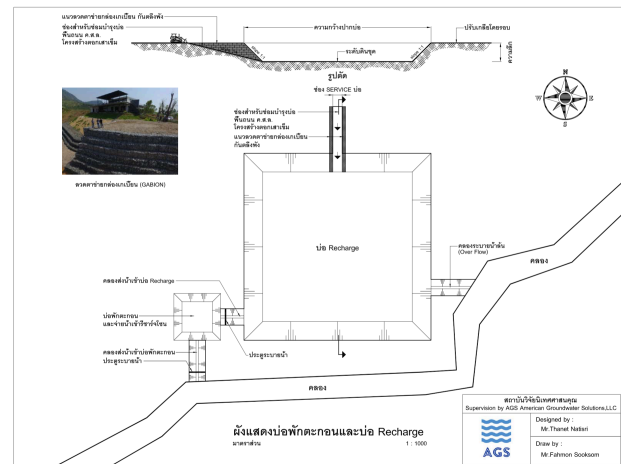
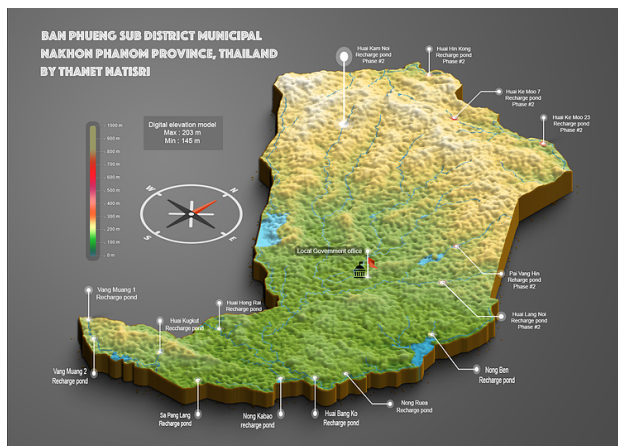
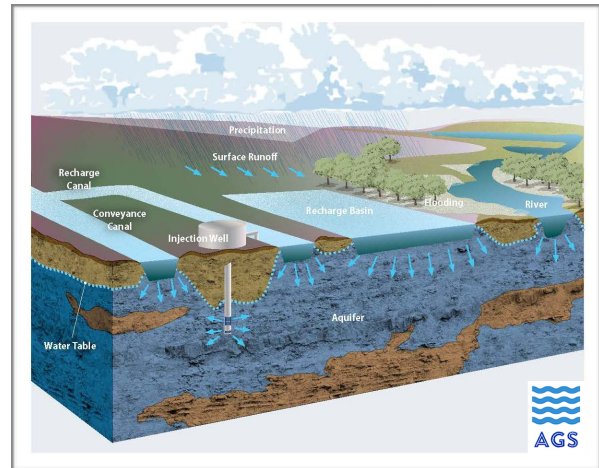
- This recharge project is a large scale aim to replenish excess rain water to aquifer to prevent groundwater overdraft. The area must be selected and designed by qualification contractors, consultants or agencies who are specialist in this field. It is to prevent the environment problems such as groundwater contamination and soil erosion in surround area. (depending on the budget, the use of Geophysical surveys may be required for more accurate planing).
- Before starting the construction, the municipal must educate its citizen who live in the area about watershed protections program.
- The project must meet regulations from the city to prevent groundwater contamination and public hearing.
- The finished sites must have a protection system such as fences and warning signs to prevent danger from people who live in its surrounding.
- The municipal must regularly maintain the recharge pond to ensure its efficiency including monitoring the change in groundwater table and its condition regularly.

INDIVIDUAL ARTIFICIAL RECHARGE PROJECT (OPEN SYSTEM IN GROUNDWATER BANK TERM)

- This technique is often used on personal property with small, medium, and large scale farming to increase the groundwater storage by constructing a system of recharge ponds.
- The size of the recharge pond depends on the necessary usage of the water and space that is available.
- The recharge ponds must be in an area where a substantial amount of rainwater from the catchment area can enter.
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- The size of a recharge pond can also depend on the soil profile. The depth of the recharge pond must reach a zone where water can percolate into the aquifers.
- If a recharge pond is constructed on farming land, the catchment area where the recharge is pond located must not have any harmful pesticides or chemicals from fertilizer that have potential to threaten or contaminate groundwater (check with your local authority to see which chemical substances are a danger to groundwater).
- Once the recharge pond is constructed it must have the protection system, a fence, and warning signs to prevent accidents with people and animal in the area.
- There are 2 ways to use the water. First, you can pump the water directly from the pond. Alternatively, you can use the water by drilling a groundwater well.
- After the recharge pond is constructed the owner must regularly maintain the recharge pond to ensure its efficiency. This includes monitoring the changes and conditions in the groundwater table regularly.



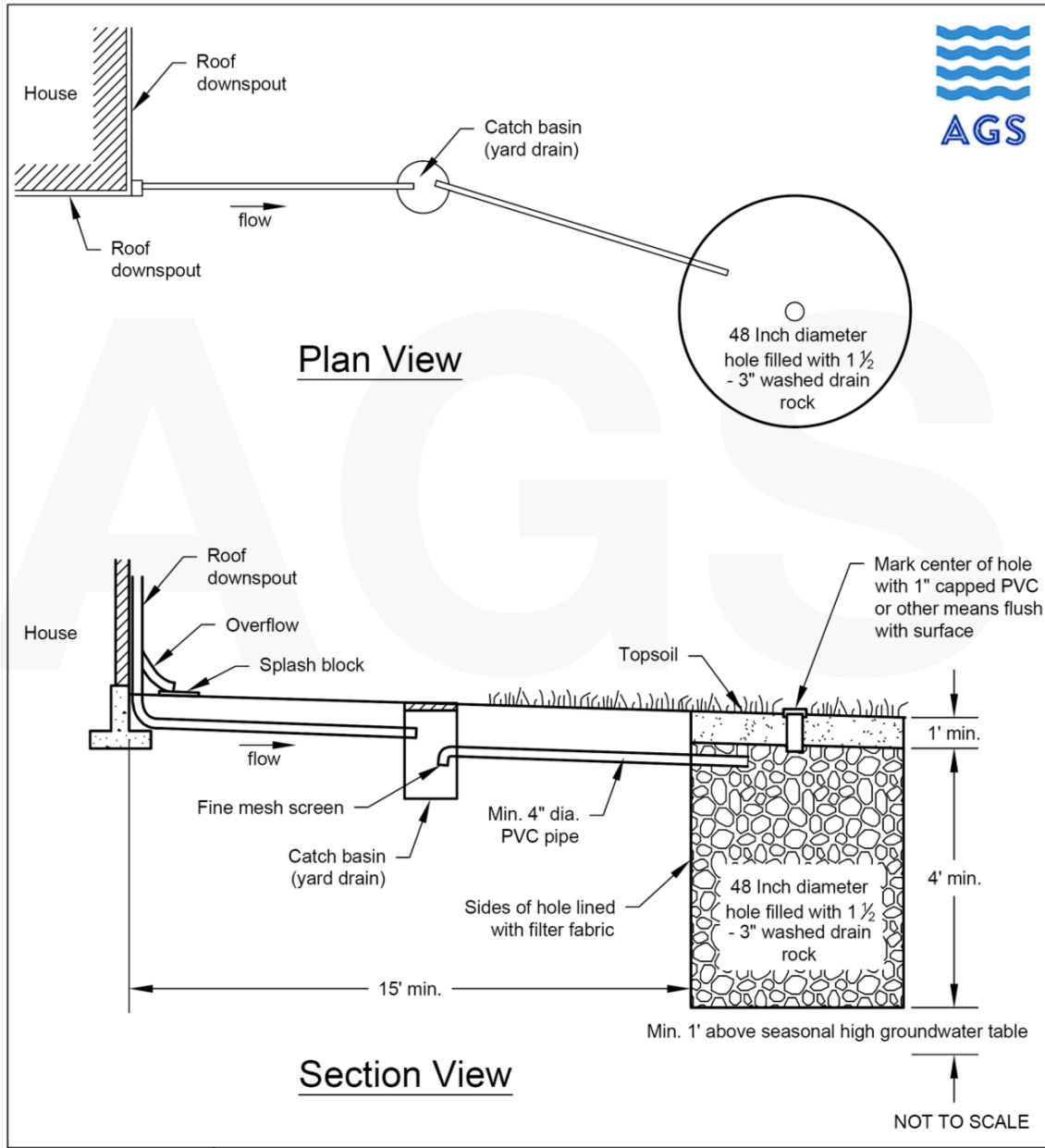
The diagram shows a cross-section of the ground with various layers and features. At the top left is the AGS logo. The ground surface is divided into several areas: a 'แม่ น้ำ' (Mother Water) area on the left, a central area with a tractor and plants, and a 'Recharge Zone' on the right. The central area is labeled 'บ่อบาดาลใช้ขุบโกลบบริโกล' (Borehole using Globobrite). The 'Recharge Zone' is labeled 'บ่อบาดาลน้ำดื่ม' (Borehole for drinking water). The ground is shown with a brown top layer and a blue bottom layer. A 'ระดับน้ำ' (Water level) is indicated by a horizontal line. The bottom layer is labeled 'บ่อบาดาลลึก' (Deep borehole). The diagram illustrates the process of water infiltration and recharge into the ground.



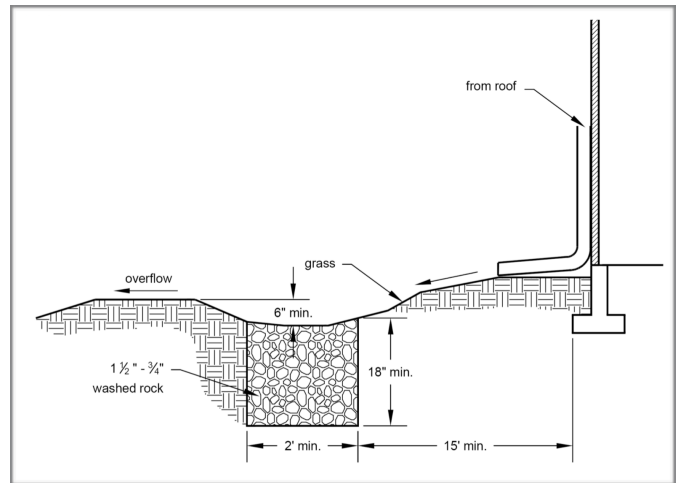
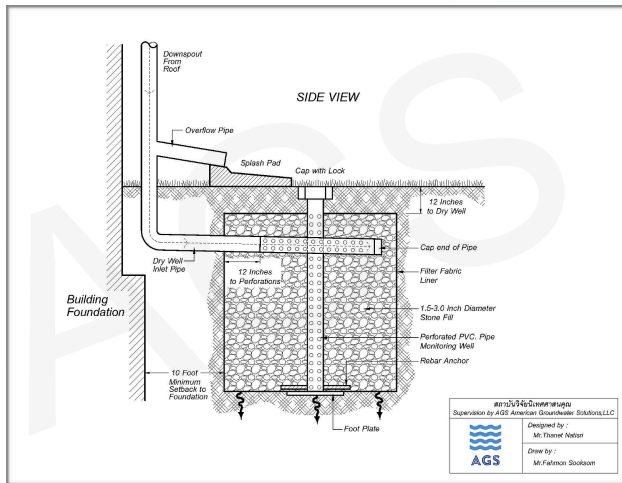
GROUNDWATER RECHARGE PROJECTS STANDARD SPECIFICATION

DRY WELL CONSTRUCTION (CLOSED SYSTEM IN GROUNDWATER BANK TERM)

“Closed System” is a program aim to encourage the local citizens to help reduce the run off by building a dry well in their properties. This will help the municipal reduce stormwater when it rains and help preventing pollution and contamination of canal, rivers and reservoir.



SPECIFICATION AND REQUIREMENT OF "CLOSE SYSTEM" (DRY WELL)



Key Design Elements

- Maintain minimum distance from building foundation (typically 10 feet)
- Provide adequate overflow outlet for large storms
- Size to retain and infiltrate the difference in runoff volume for the 2-year storm, pre- to post- development
- Depth of Dry Well aggregate should be between 18 and 48 inches deep
- At least one observation well; clean out is recommended
- Wrap aggregate with non-woven geotextile
- Maximum drain-down time is 48 hours
- Provide pre-treatment for some situations

Potential Applications

Residential Subdivision: YES
Commercial: YES
Ultra Urban: YES
Industrial: LIMITED
Retrofit: YES
Highway/Road: NO

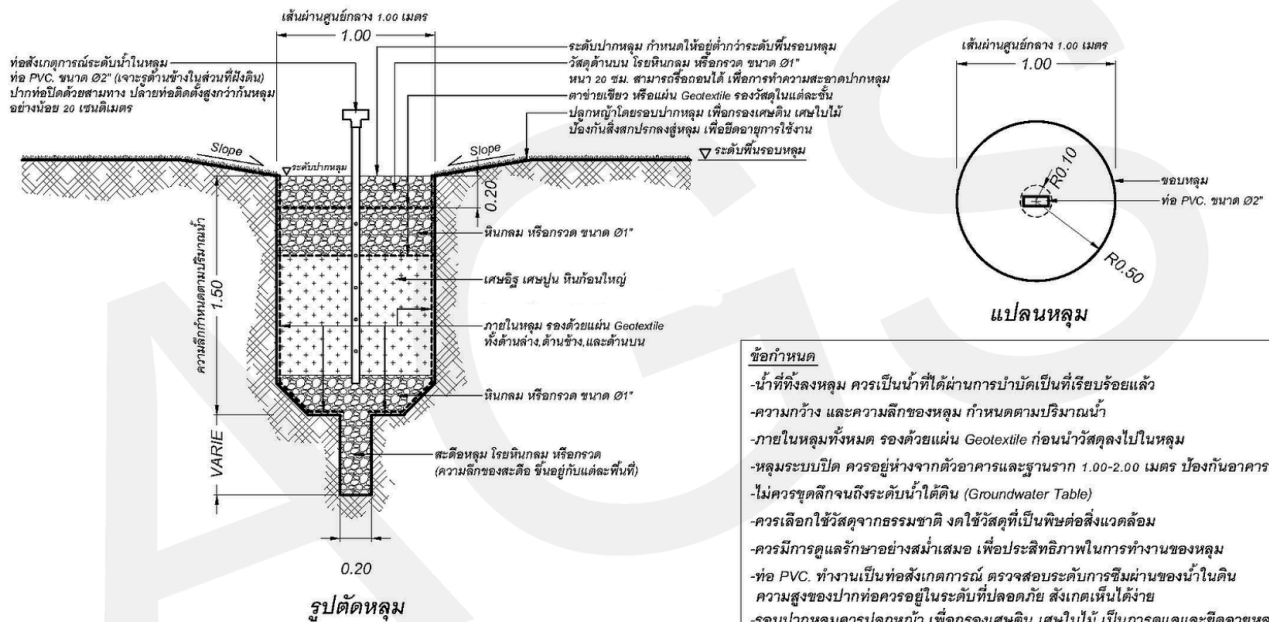
Stormwater Functions

Volume Reduction: Medium
Recharge: Medium
Peak Rate Control: Medium
Water Quality: Medium

Pollutant Removal

Total Suspended Solids: x
Nutrients: x
Metals: x
Pathogens: x

หลุมส่งน้ำลงใต้ดิน แบบครัวเรือน



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For more information visit: www.usagroundwater.com
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**ARTIFICIAL RECHARGE POND
(GWB OPEN SYSTEM)**



WATERSHED PROTECTION



**RESIDENTIAL DRY WELL
(GWB CLOSE SYSTEM)**

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