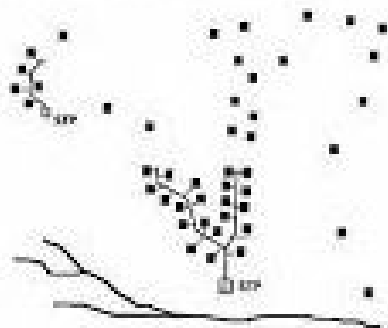
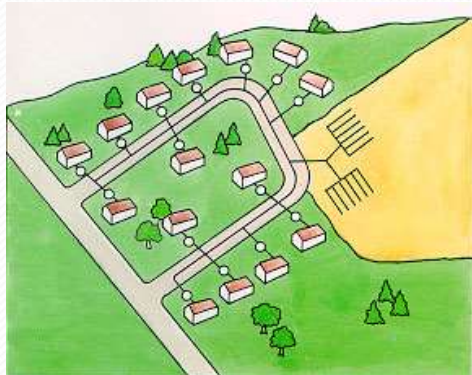


# Decentralized Domestic Wastewater Treatment in Thailand



**Pannapat Chuncharoensook**  
**Director of Wastewater Management Department 2**

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**Wastewater Management Authority**

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## Table of Contents

- Thailand Environmental Laws
- Central Domestic Wastewater Treatment Plant in Thailand
- Surface Water Quality in 2018
- Current Situation of Domestic Wastewater in Thailand
- On-Site Treatment Facilities and Central Domestic WTP
- Capacity of Septic Tank
- Wastewater Management Authority (WMA)
- WMA Projects
- Small Scale Wastewater Treatment System
- WMA Future Steps



# Thailand Environmental Laws



The Enhancement and Conservation of National Environmental Quality Act

B.E. 2535 (1992)

consists of

(1) Air and Noise Pollution

(2) **Water Pollution**

(3) Other Pollution and Hazardous Waste

[Download document](#)



# Central Domestic Wastewater Treatment Plant in Thailand



| Thailand Population = 69.04 million                          |   |
|--|---|
| Total Provinces  | 76  |
| Total Local Governments                                      | 7,852   |
| Total Owner of Central Domestic WTP                          | 91<br><i>(1.16% of Total Local Governments)</i> |
| Total Central Domestic Wastewater Treatment Plant            | 105   |
| Location of 105 Central Domestic Wastewater Treatment Plants | <a href="#">Download picture</a>                |





# Surface Water Quality in 2018

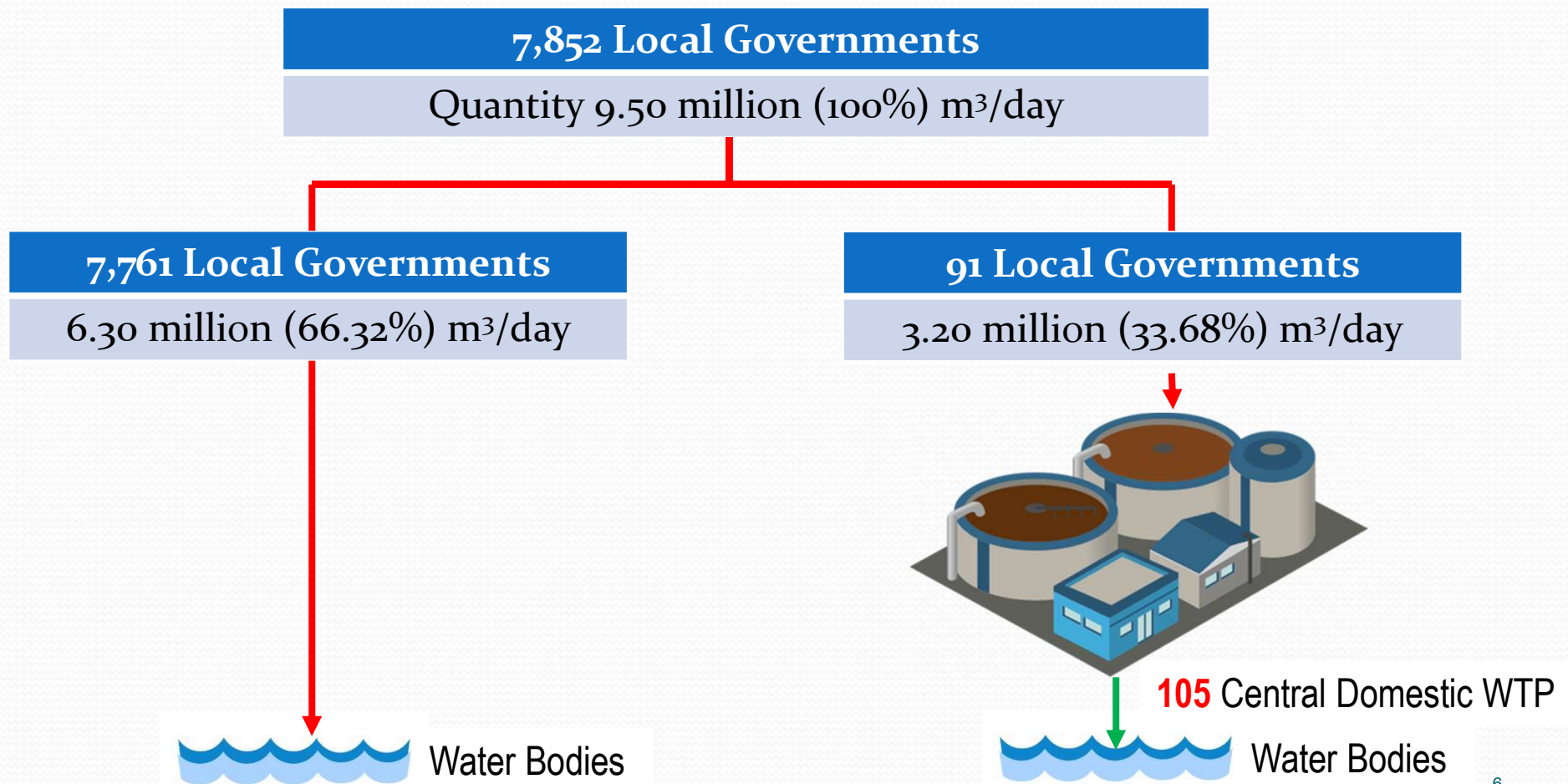
The results of testing water quality from

- 59 majors rivers
- 6 standing water sources

| Water Quality Index (WQI) | Surface water resources in each region <sup>(WQI/DO)</sup>   |  |  |  |   | Percentage |
|---------------------------|--|--|--|--|---|------------|
|                           | Northern region  | Central region   | Northeastern region  | Eastern region   | Southern region   |            |
| Excellent (91-100)        | -  | -  | -  | -  | -   | 0          |
| Good (71-90)              | Mae change <sup>(78,4.5)+</sup><br>Li <sup>(73,4.3)</sup><br>Ing <sup>(74,2.7)</sup><br>Kok <sup>(71,4.0)+</sup><br>Wang <sup>(71,4.2)+</sup><br>Bueng Boraphet <sup>(71,2.4)+</sup> | Khwaie Noi <sup>(93,4.0)</sup><br>Khwaie Yai <sup>(77,2.0)</sup><br>Kui Buri <sup>(76,3.5)+</sup><br>Upper Phetchaburi <sup>(73,5.8)</sup><br>Pran Buri <sup>(73,2.5)+</sup>   | Lam Chee <sup>(82,2.8)</sup><br>Songkram <sup>(81,4.1)</sup><br>Loei <sup>(71,4.2)</sup><br>Nong Han <sup>(80,2.9)</sup><br>Oon <sup>(85,4.2)</sup><br>Chi <sup>(80,3.5)+</sup><br>Lampao <sup>(79,4.9)+</sup><br>Siew <sup>(76,2.2)+</sup><br>Phong <sup>(76,2.8)+</sup><br>Mun | Welu <sup>(71,4.7)+</sup>  | Upper Tapi <sup>(90,6.9)</sup><br>Phum Duang <sup>(78,6.0)+</sup><br>Upper Pattani <sup>(74,5.4)+</sup><br>Lower Pattani <sup>(73,3.2)+</sup><br>Pak Phanang <sup>(72,2.9)+</sup><br>Songkhla Lake <sup>(72,6.5)+</sup><br>Sai Buri <sup>(75,4.5)</sup> | 45         |
| Fair (61-70)              | Kwan Phayao <sup>(69,6.7)</sup><br>Ping <sup>(64,2.3)</sup><br>Nan <sup>(63,4.8)</sup><br>Yom <sup>(61,2.0)</sup>  | Upper Chao Phraya <sup>(70,5.2)</sup><br>Upper Tha Chin <sup>(65,2.4)</sup><br>Central Chao Phraya <sup>(64,3.2)</sup><br>Mae Klong <sup>(70,2.2)</sup><br>Pa Sak <sup>(67,2.1)</sup><br>Noi <sup>(68,4.1)</sup><br>Lower Petchaburi <sup>(66,4.8)</sup> | Upper Lamtakong <sup>(67,6.6)+</sup>   | Chanthaburi <sup>(70,4.1)</sup><br>Trat <sup>(66,2.2)</sup><br>Lower Phangrad <sup>(63,4.9)</sup><br>Nakhon Nayok <sup>(64,3.0)+</sup><br>Upper Rayong <sup>(62,3.0)+</sup><br>Lower Rayong <sup>(62,2.8)+</sup><br>Bang Pakong <sup>(61,3.0)</sup><br>Prasae <sup>(69,2.8)</sup><br>Prachinburi <sup>(65,4.4)</sup> | Chumphon <sup>(66,2.8)</sup><br>Trang <sup>(65,2.8)</sup><br>Thale Noi <sup>(66,2.2)+</sup><br>Thale Luang <sup>(68,4.3)+</sup><br>Lower Tapi <sup>(70,2.8)</sup><br>Lower Lang Suan <sup>(67,4.4)+</sup><br>Upper Lang Suan <sup>(66,7.3)+</sup>       | 43         |
| Poor (31-60)              | Kuang <sup>(58,3.4)</sup>  | Central Tha Chin <sup>(57,2.4)</sup><br>Lower Chao Phraya <sup>(57,1.5)</sup><br>Lower Tha Chin <sup>(66,3.0)</sup><br>Sakae Krang <sup>(59,4.7)</sup><br>Lopburi <sup>(59,2.4)</sup>  | Lower Lamtakong <sup>(64,1.0)</sup>  | Upper Phangrad <sup>(69,3.0)</sup>   | -   | 12         |
| Very poor (0-30)          | -  | -  | -  | -  | -   | 0          |

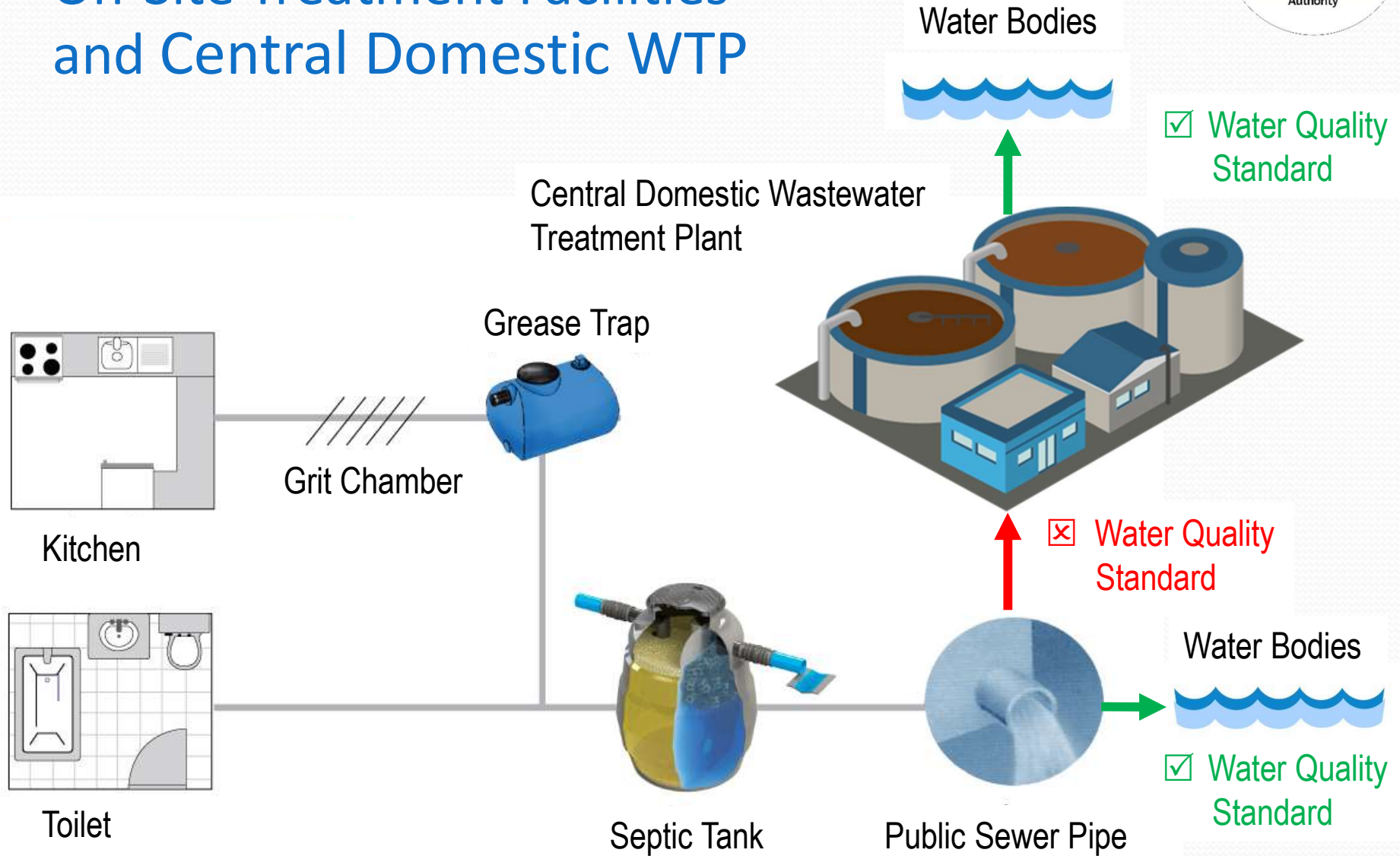
# Current Situation of Domestic Wastewater in Thailand

Pollution Sources : Residential, Markets, Offices, Hotels etc.

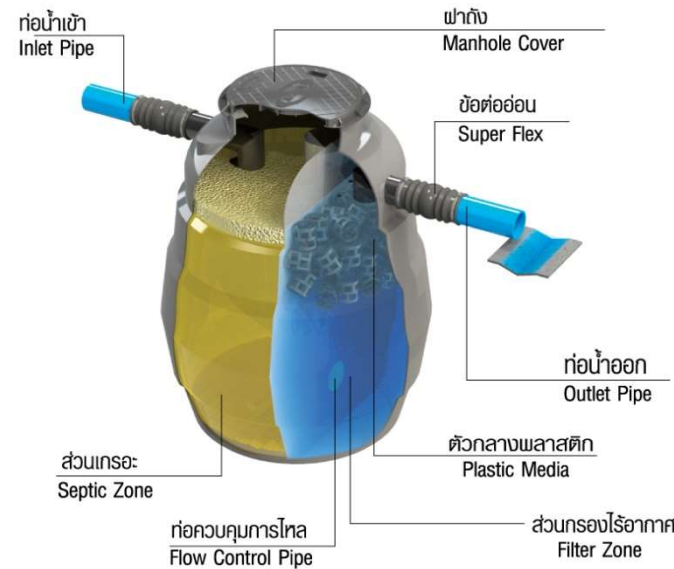




# On-Site Treatment Facilities and Central Domestic WTP



# Capacity of Septic Tank



lpcd = litre per capital per day

Sources : Aqua Nishihara Corporation limited

| รุ่น Model | จำนวนผู้ใช้ (คน) Population |                   |                    |                   |  |                   |                           |                    |                          |                    | ห้องอาหาร Canteen |                   |
|------------|-----------------------------|-------------------|--------------------|-------------------|--|-------------------|---------------------------|--------------------|--------------------------|--------------------|-------------------|-------------------|
|            | บ้านพักอาศัย Residential    |                   | สำนักงาน Office    |                   | โรงเรียน / มหาวิทยาลัย University รวมทุกส่วน |                   | โรงงาน Factory รวมทุกส่วน |                    | โรงงาน Factory เฉพาะสุขา |                    |                   | เฉพาะส่วน 20 lpcd |
|            | รวมทุกส่วน 200 lpcd         | เฉพาะส่วน 80 lpcd | รวมทุกส่วน 80 lpcd | เฉพาะส่วน 60 lpcd | รวมทุกส่วน 80 lpcd                           | เฉพาะส่วน 60 lpcd | ส่วนตึกแรก 50 lpcd        | ส่วนชักรอก 80 lpcd | ส่วนตึกแรก 40 lpcd       | ส่วนชักรอก 60 lpcd |                   |                   |
| AP-1200    | 3                           | 8                 | 8                  | 10                | 8  | 10                | 13                        | 8                  | 16                       | 10                 | 32                |                   |
| AP-1600    | 5                           | 11                | 11                 | 14                | 11   | 14                | 17                        | 11                 | 22                       | 14                 | 44                |                   |
| AP-1800    | 6                           | 12                | 12                 | 16                | 12   | 16                | 19                        | 12                 | 24                       | 16                 | 48                |                   |
| AP-2000    | 7                           | 14                | 14                 | 18                | 14   | 18                | 22                        | 14                 | 28                       | 18                 | 56                |                   |
| AP-2230    | 7                           | 15                | 15                 | 20                | 15   | 20                | 24                        | 15                 | 30                       | 20                 | 60                |                   |
| AP-3000    | 8                           | 20                | 20                 | 27                | 20   | 27                | 32                        | 20                 | 40                       | 27                 | 80                |                   |
| AP-4000    | 10                          | 26                | 26                 | 34                | 26   | 34                | 41                        | 26                 | 52                       | 34                 | 104               |                   |
| AP-5000    | 13                          | 33                | 33                 | 44                | 33   | 44                | 52                        | 33                 | 66                       | 44                 | 132               |                   |
| AP-6000    | 16                          | 40                | 40                 | 53                | 40   | 53                | 64                        | 40                 | 80                       | 53                 | 160               |                   |





# Wastewater Management Authority (WMA)

State enterprise established under the Royal Decree Establishing the Wastewater Management Authority B.E. 2538 (1995) on 15<sup>th</sup> August 1995

The organization previously operated under the Ministry of Science, Technology and Environment (MOSTE) and was transferred to the Ministry of Natural Resources and Environment (MONRE) on 3<sup>rd</sup> October 2002.

Recently, WMA is administered under the Ministry of Interior (MOI) since 23<sup>rd</sup> November 2018.

## WMA vision

Manage domestic wastewater to meet the water quality standard with sustainability within the year 2026



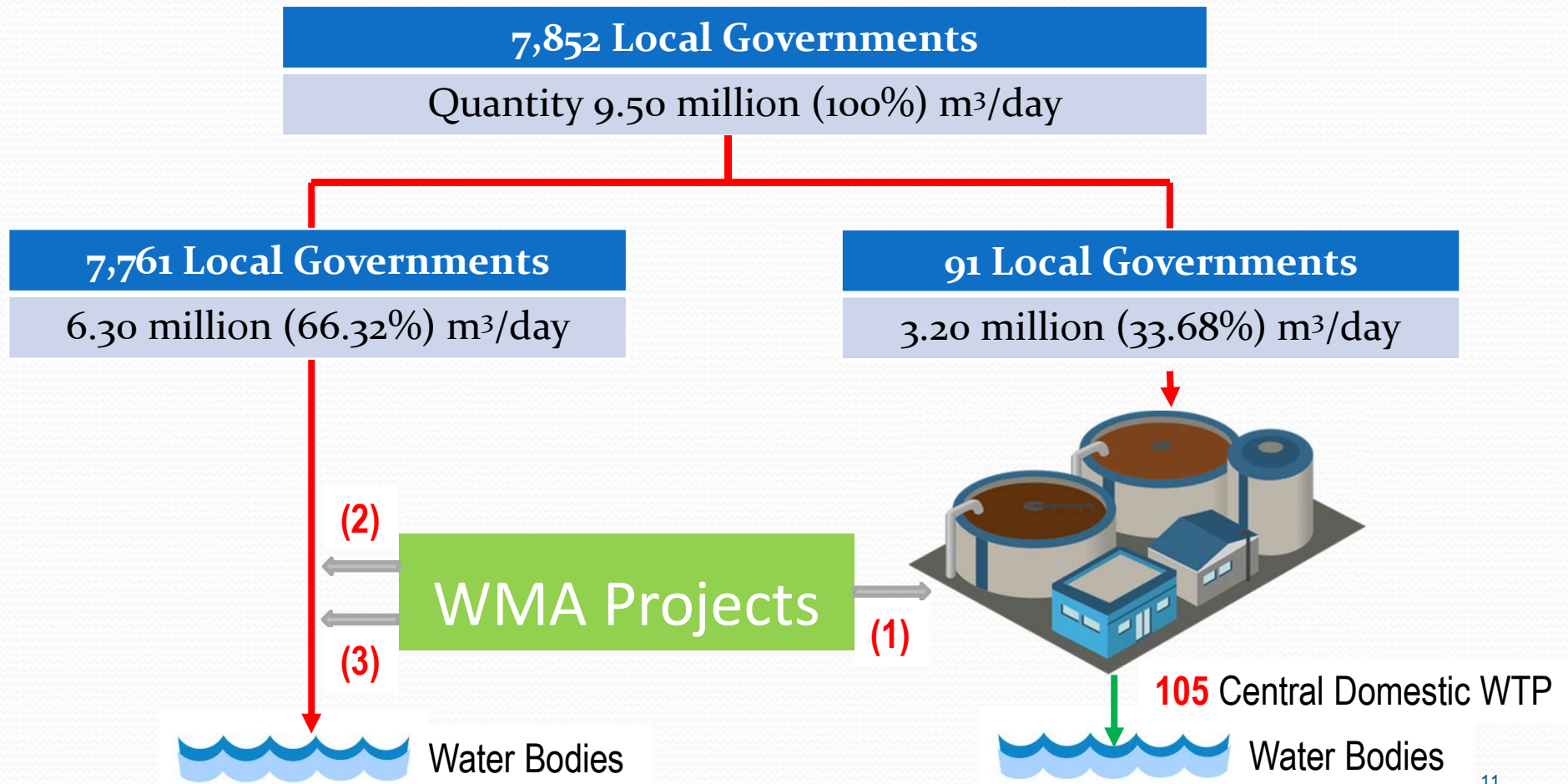
## WMA Projects

- (1) Long term project to provide wastewater treatment system rehabilitation and management to 25 local governments. (26 of 105 existing Central Domestic Wastewater Treatment Plants)
- (2) Construction and management of 19 small scale wastewater treatment systems. (19 local governments)
- (3) Operation and management of wastewater treatment system in the project areas under Royal Initiatives. (7 systems of 4 local governments and 1 organization)



# WMA Projects

Pollution Sources : Residential, Markets, Offices, Hotels etc.



# Small Scale Wastewater Treatment System

## Conceptual Design



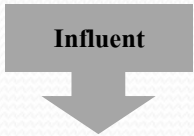
- ✓ Public acceptance
- ✓ Appropriate budget for construction, operate and maintenance
- ✓ Water Quality Standard
- ✓ Water reuse
- ✓ Decentralized



# Sequential Batch Reactor (SBR)



**Pumping Station**



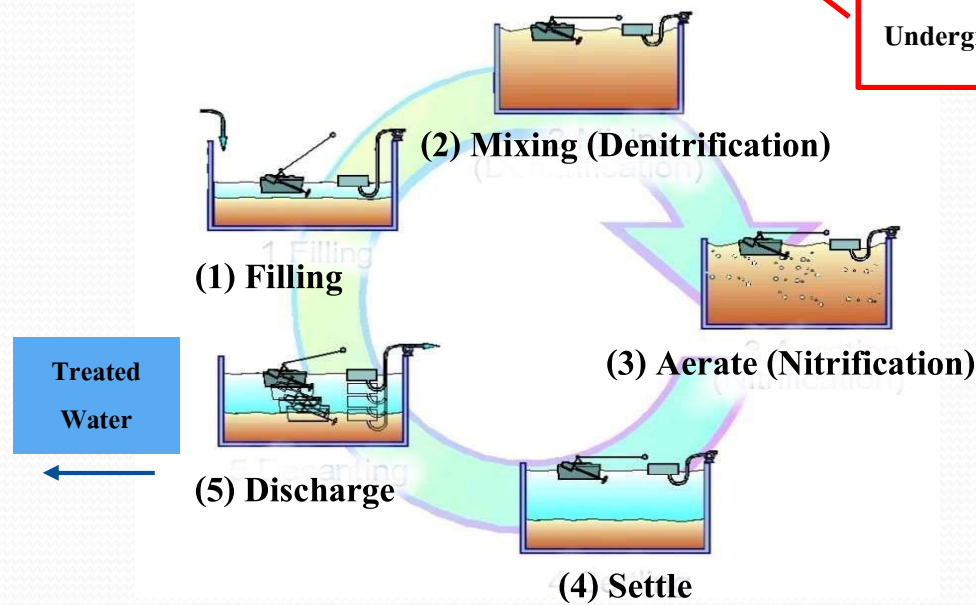
**Bar Screen**



**Wastewater Pump**



**Underground Structure**





# Activated Sludge/Fixed Film



**Pumping Station**



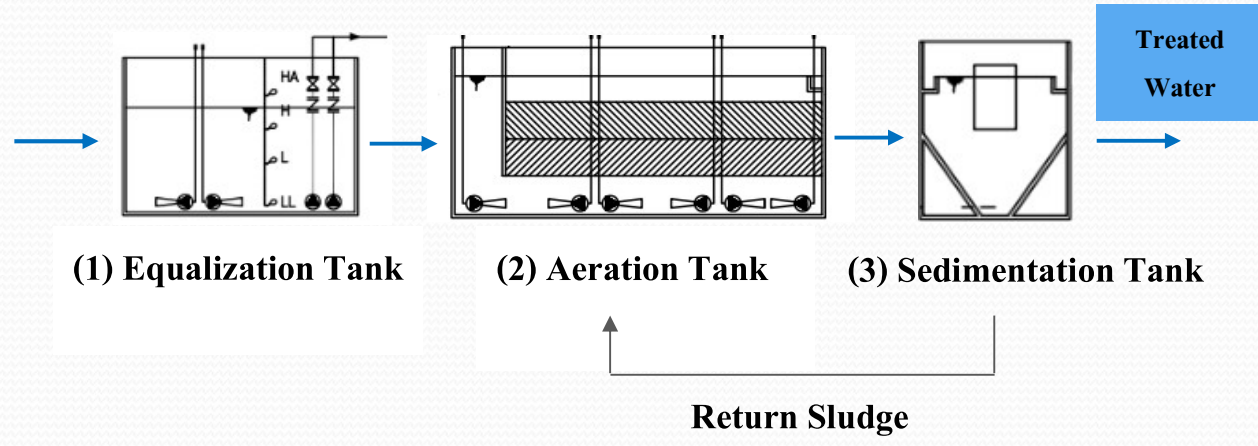
**Bar Screen**



**Wastewater Pump**



**Underground Structure**







# WMA Future Steps

- (1) Expand Wastewater Management Area.
- (2) Construction and Management of 764 small Scale Wastewater treatment Systems. (448 local governments )

| Water Quality Index (WQI) | Surface water resources in each region <sup>(WQI/00)</sup>   |  |  |  |   | Per-centage |
|---------------------------|--|--|--|--|---|-------------|
|                           | Northern region  | Central region   | Northeastern region  | Eastern region   | Southern region   |             |
| Excellent (91-100)        | -  | -  | -  | -  | -   | 0           |
| Good (71-90)              | Mae change <sup>(76,4,5)+</sup><br>Li <sup>(73,4,3)</sup><br>Ing <sup>(74,2,7)</sup><br>Kok <sup>(71,4,0)+</sup><br>Wang <sup>(71,4,2)+</sup><br>Bueng Boraphet <sup>(71,2,4)+</sup> | Khwaie Noi <sup>(93,4,0)</sup><br>Khwaie Yai <sup>(77,2,0)</sup><br>Kui Buri <sup>(76,3,3)+</sup><br>Upper Phetchaburi <sup>(73,5,8)</sup><br>Pran Buri <sup>(73,2,3)+</sup>   | Lam Chee <sup>(82,2,4)</sup><br>Songkram <sup>(81,4,1)</sup><br>Loei <sup>(71,4,2)</sup><br>Nong Han <sup>(80,5,9)</sup><br>Oon <sup>(85,4,2)</sup><br>Chi <sup>(80,5,1)+</sup><br>Lampao <sup>(79,4,9)+</sup><br>Siew <sup>(76,2,2)+</sup><br>Phong <sup>(76,5,4)+</sup><br>Mun | Welu <sup>(71,4,7)+</sup>  | Upper Tapi <sup>(90,4,9)</sup><br>Phum Duang <sup>(78,6,0)+</sup><br>Upper Pattani <sup>(74,5,4)+</sup><br>Lower Pattani <sup>(73,5,2)+</sup><br>Pak Phanang <sup>(72,5,9)+</sup><br>Songkhla Lake <sup>(72,4,5)+</sup><br>Sai Buri <sup>(75,4,5)</sup> | 45          |
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| Very poor (0-30)          | -  | -  | -  | -  | -   | 0           |