

## What are the benefits of implementing BMPs?



Cut-off drain channels rainwater runoff to the water treatment pond and pond water can be used for irrigation

Source: NParks

Use of proper composting facility with roofed and kerbed areas



Source: PUB



Good housekeeping allows optimal use of plot space

Source: NParks

Growing wetland plants in the water treatment pond allows a more environmentally sustainable treatment process as compared to chemical treatment of nutrient-rich runoff



Source: PUB

## What can farmers do to protect reservoir water quality?

- Implement Best Management Practices.
- Clean the water treatment pond regularly and dispose sediment off-site.
- Do not use raw animal waste as fertilisers in plant nurseries activities.
- Ensure all compost is fully composted before use.
- Use only pesticides and herbicides registered with AVA.
- Do not apply fertilisers, soil amendments and pesticides within 2 metres of the drains or the reservoir.
- Store fertilisers, soil amendments and pesticides in roofed or properly covered and kerbed areas.
- Properly dispose fertilisers, pesticides and plant waste to prevent them from entering the drains.
- Ensure that used water is not discharged directly into the drains.

### For more information, please contact:

National Parks Board of Singapore (**NParks**)  
Ms Chia Yan Shan, Tel: 6462 7309

**PUB**, Singapore's National Water Agency  
24-Hours Call Centre: 1800 CALL PUB (1800 2255 782)

National Environment Agency of Singapore (**NEA**)  
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## Protecting Our Reservoirs

*in Water Catchments with Agricultural Activities*

Kranji Reservoir is one of the 17 reservoirs in Singapore, and a source of our water supply. Many farms with land agricultural activities are sited within Kranji Reservoir's water catchment area. This means that rainwater runoff and discharges carrying nutrients will flow into the reservoir.

The increase in farming activities, if not properly managed, may result in poor reservoir water quality. It is important to implement Best Management Practices (BMPs) to manage discharges to protect the reservoir water, while maintaining the sustainability of farmlands.

### How do agricultural activities affect reservoir water?

Sources of nutrients include fertilisers, pesticides, fungicides, herbicides and animal waste. Poor management of the farmlands may lead to high levels of suspended solids and nutrients (nitrogen and phosphorus) entering the reservoir, especially during heavy rain, and lead to algal growth and uncontrolled aquatic plant growth.



Algal growth



Source: PUB

Uncontrolled aquatic plant growth

Pollution control measures need to be implemented at source to prevent the water quality of Kranji Reservoir from being affected in the long run.

## How does PUB protect reservoir water quality?

Since 2005, PUB has embarked on the Integrated Catchment Water Quality Management (ICWQM) programme to safeguard our water resources and prevent deterioration of reservoir water quality.

The programme comprises four key strategies:

1. Source control e.g. extensive monitoring and control of pollution sources
2. Mitigation measures e.g. installation of wetland systems
3. Stakeholder engagement e.g. educational brochures
4. Use of technology e.g. online and autonomous water quality monitoring devices

In addition, comprehensive monitoring of water quality in all reservoirs and water catchment areas is carried out as part of the on-going efforts to ensure a clean and sustainable water supply.



Sengkang Floating Wetland

Source: PUB

Educational brochure



## What requirements must my farm meet?

PUB requires water pollution control measures to be incorporated in the design of all farmlands and all farms shall implement Best Management Practices (BMPs).

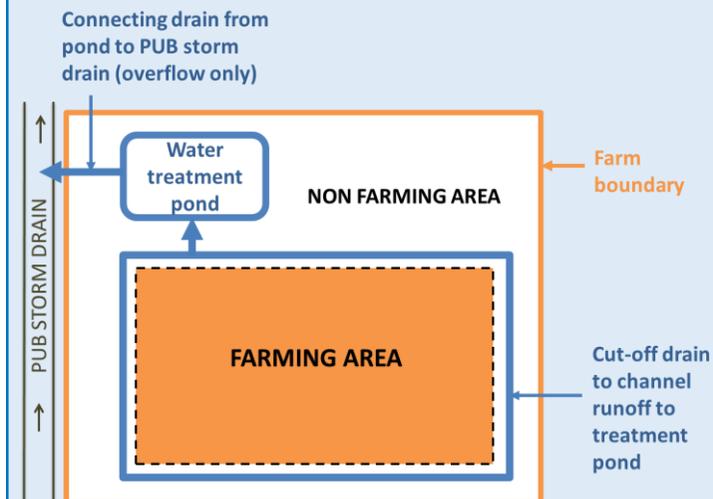
- Under the **Environmental Protection and Management Act (EPMA)**, trade effluent discharge into any drain within water catchment must comply with:
  - Part V Water Pollution Control
  - Allowable limits for trade effluent discharge into controlled watercourses
- PUB's discharge water quality guidelines** for water catchment areas are:
  - Total Nitrogen (TN)  $\leq 10$  mg/L
  - Total Phosphorus (TP)  $\leq 0.65$  mg/L
  - Total Suspended Solids (TSS)  $\leq 30$  mg/L

## Implementation of Best Management Practices (BMPs)

Best Management Practices (BMPs), such as installation of cut-off drain at the farming area and water treatment pond, are to be put in place at all farms to manage rainwater runoff to prevent nutrients from the farms from entering the reservoirs. A proposed layout is shown on the next page.

Farm owners and Qualified Persons (QPs) can provide alternative proposals on BMPs to meet the pollution control requirements for PUB's evaluation.

## Proposed layout of cut-off drain and water treatment pond



## A typical treatment pond

