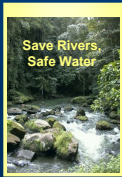


SWaM 2019 “National Conference on Stormwater Management – Managing Stormwater Runoff”

The Detention and Retention Ponds – “A Bone or Bane for Stormwater Management in Housing Development in Malaysia”



SWaM 2019 - The Detention and Retention Ponds - "A Bone or Bane for Stormwater Management in Housing Development in Malaysia

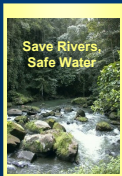
URBAN STORMWATER MANAGEMENT

Why? :

- Surface runoff has to be reduced to prevent flooding;
- Especially in urban areas where the natural infiltration is reduced;
- Sediments and pollutants must be removed.

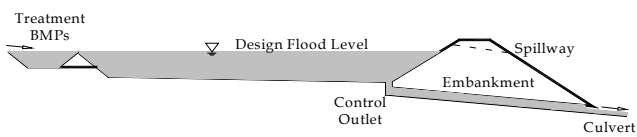
How? :

- Temporary storage (e.g. flood detention basins, on-site detention (OSD), rainwater harvesting), etc.
- Infiltration (e.g. grass filter stripes, infiltration trench, infiltration basin, etc.)

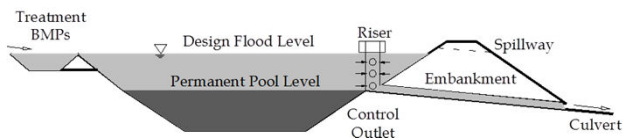


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TYPICAL FLOOD DETENTION POND



a) Dry Type

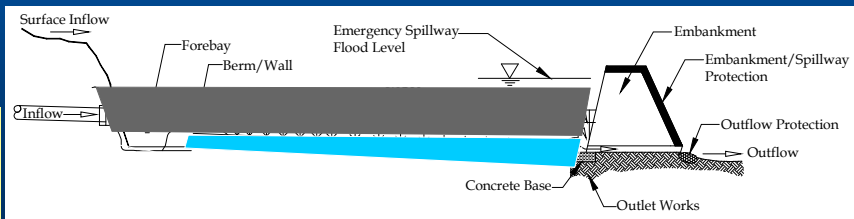
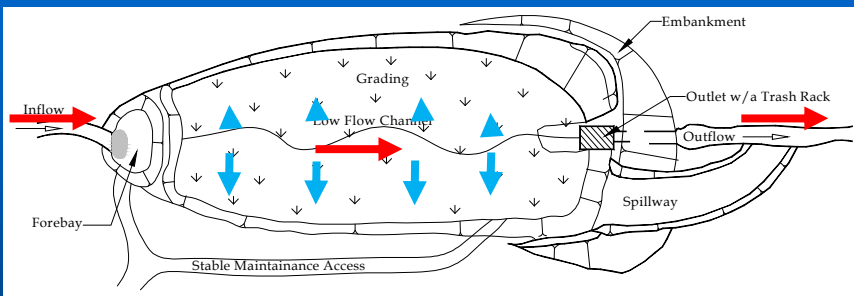


b) Wet Type



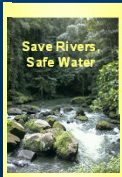
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Dry Type Water Quality Detention Pond



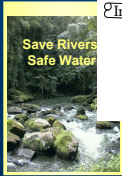
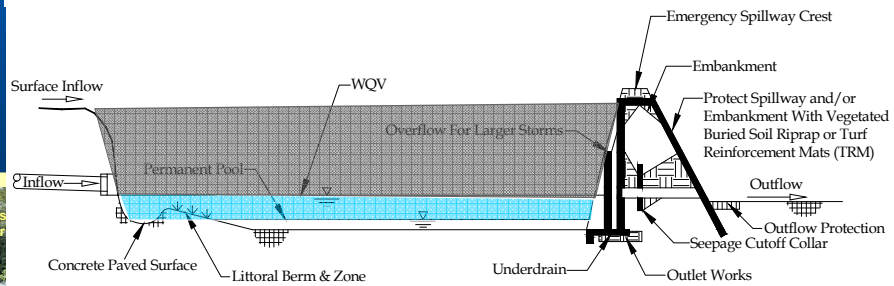
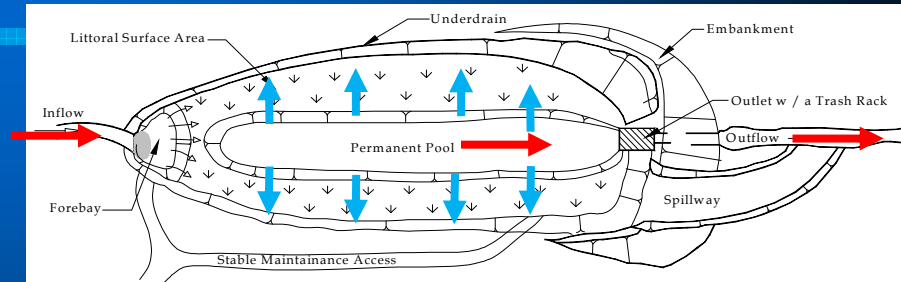
SWaM 2019 - The Detention and Retention Ponds - "A Bone or Bane for Stormwater Management in Housing Development in Malaysia"

Dry Type Water Quality Detention Pond



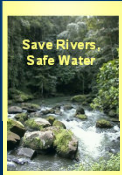
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Wet Type Water Quality Detention Pond



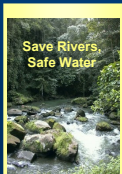
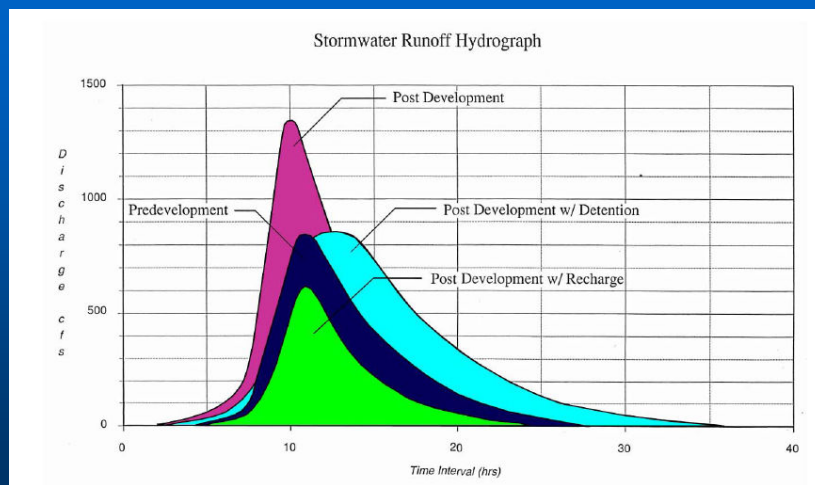
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Wet Type Water Quality Detention Pond



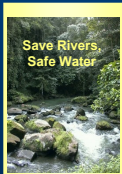
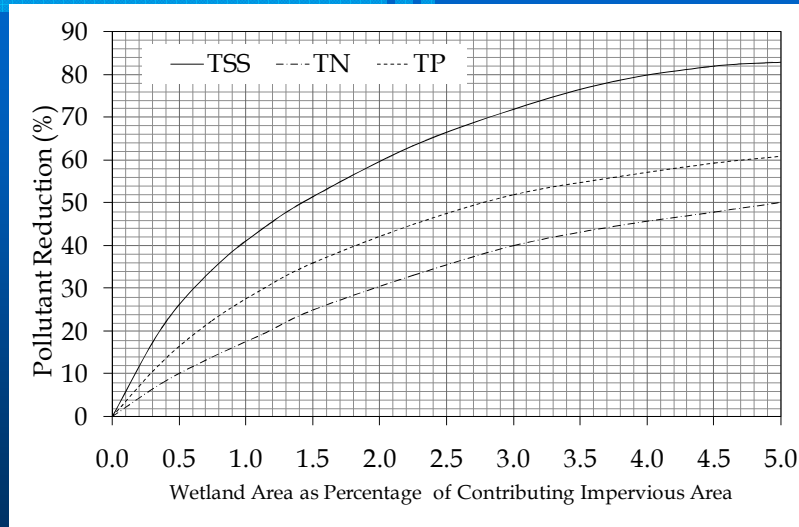
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Flood Peak Control from Storage Pond



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Water Quality Improvement from Storage Pond



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Improves Community Access and Recreational Use



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Raises Community Awareness of Local Flood Risk & Water Quality

Wet Ponds
collect and store rainwater, releasing it slowly to streams.

precipitated stormwater
water level after storm
normal water level
sediment filters out
clearer water flows slowly to streams

Stormwater is rain that runs off hard surfaces and carries pollution to our streams. Montgomery County has thousands of practices like this one to protect streams and the Chesapeake Bay.
They're our streams. Let's keep them clean!

WARNING
ONSITE DETENTION AREA
STORMWATER MAY RISE
IN THIS AREA
DURING HEAVY RAIN

PLEASE
DO NOT THROW
CIGARETTE
BUTTS
IN THE RIVER
THE DUCKS
ARE GETTING
CANCER

Think of the ducks!

Save Rivers, Safe Water

SWaM 2019 - The Detention and Retention Ponds - "A Bone or Bane for Stormwater Management in Housing Development in Malaysia"

Alternative Source of Water Supply

Outer
Filter & Pump
Rainwater Collection Tank

WARNING RAINWATER

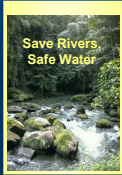
Save Rivers, Safe Water

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Downstream Flood Peak Control from Detention Pond

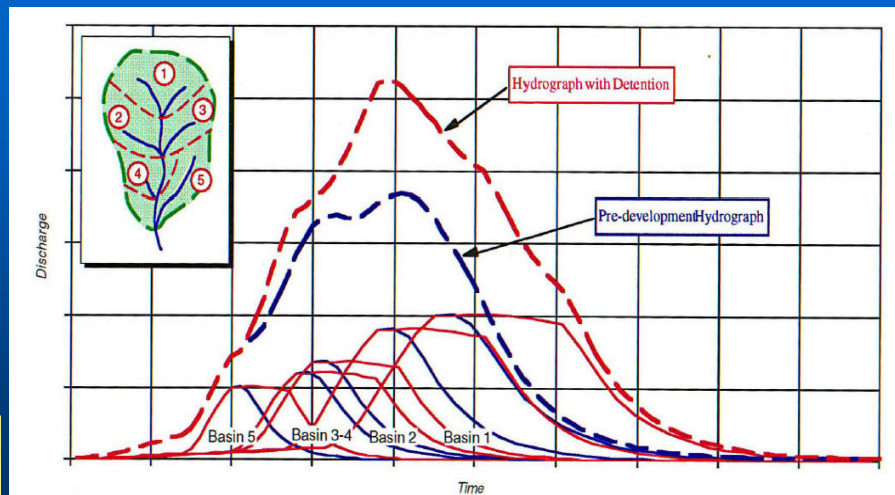
Impact towards Downstream Flood Peak (further downstream) for the requirement to control the Pre- & Post-Development to be the same normally cannot be met :

- Flood detention ponds do not reduce the runoff volume
- At downstream stretch, the time of concentration is longer. Longer and higher volume of runoff hydrographs normally make the individual detention upstream less effective
- Depends on the basin characteristics and rainfall patterns, with detention ponds upstream may worsen the peak discharges downstream
- Should be designed for full range of flood events (from regular to extremely rare floods) to insure their placement and function does not cause adverse impacts both upstream or downstream areas.



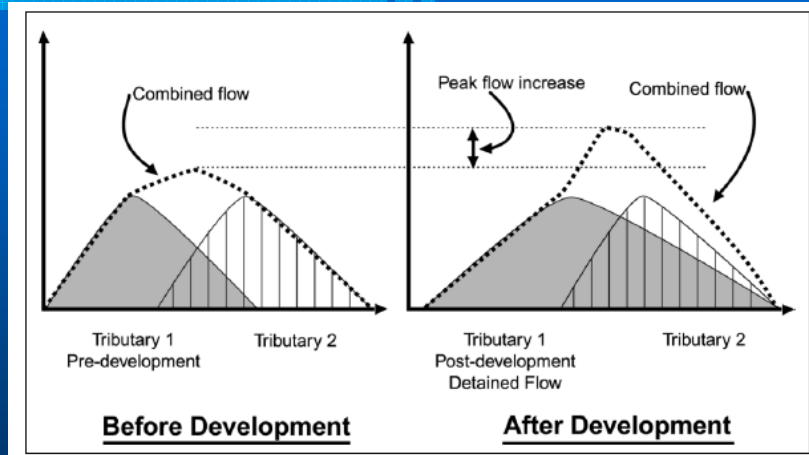
SWaM 2019 - The Detention and Retention Ponds - "A Bone or Bane for Stormwater Management in Housing Development in Malaysia

Effectiveness of Detention Ponds



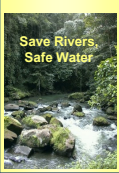
SWaM 2019 - The Detention and Retention Ponds - "A Bone or Bane for Stormwater Management in Housing Development in Malaysia

Effectiveness of Detention Ponds

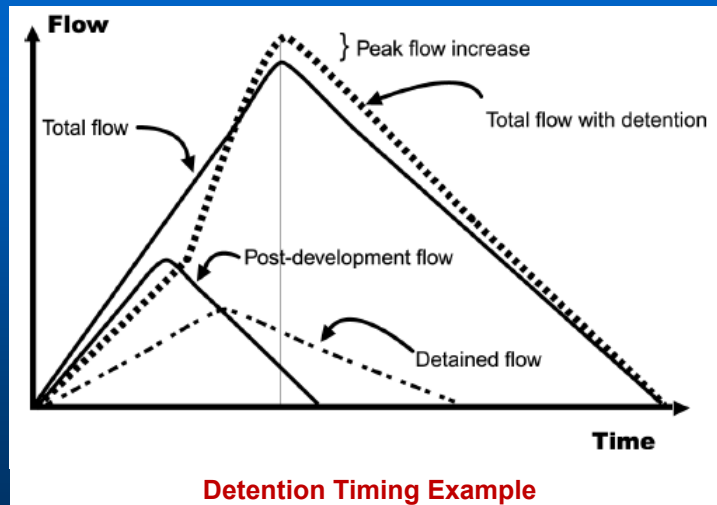


Effect of Increased Post-Development Runoff Volume with Detention on a Downstream Hydrograph

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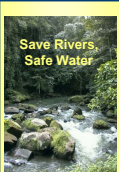


Effectiveness of Detention Ponds



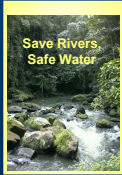
Detention Timing Example

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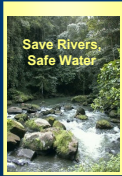
Water Quality Issues

- Stormwater detention pond is meant to improve the water quality from non-point sources during rainstorm and not for point sources pollution
- Pollutants and sediments that are excessively accumulated in the pond, can be carried downstream in large plumes causing major water quality issues during large flood event.
- Highly polluted detention ponds will affect the flora and fauna as well as not attractive to any recreational purposes



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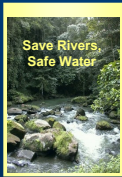
Water Quality Issues



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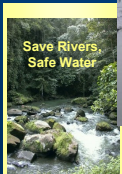
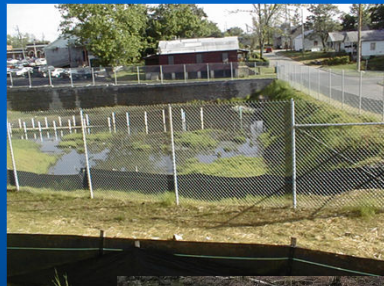
Safety & Health Issues

- If the pond outlet is not designed accordingly or choked up, it will cause flooding to the surrounding areas
- Pond edges should be safe for the community especially children. Fencing is required for areas that can post safety issues.
- Polluted detention ponds can post health issues
- Rainwater harvesting tanks can be potential mosquito breed areas



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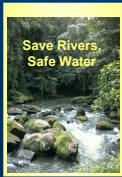
Safety & Health Issues



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Control and Maintenance Issues

- Upstream sediment and pollution controls such as implement ESCP at new construction sites, control source pollutants, provides GPT at strategic locations, etc.
- Alterations at premises that reduce the effectiveness of OSD such as converting it to balcony, storage place, etc.,
- Proper pond maintenance so that it function as per original design such as whether the pond siltation has affected the life storage, outlet choked with debris, emergency spillways overgrowth with bushes/trees, etc.
- Ponds that located inside the Strata Land Title normally will be managed and maintained by the property management team. Although this relieves the local council from maintaining the ponds, the management team may alter the pond design without informing the council.



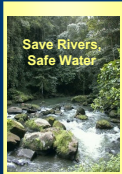
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Wet Detention Pond, Matahari Heights, Negeri Sembilan



Newly Built :

1. Proper landscape
2. Nice jogging track
3. Potential – fishing activity



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Wet Detention Pond, Matahari Heights, Negeri Sembilan

Observation :

1. Pond – polluted & smelly
2. Pond surrounding & jogging track – covered with weed & wild grass
3. Vandalism – flood gate damaged

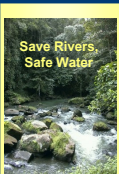


SWaM 2019 - The Detention and Retention Ponds - "A Bone or Bane for Stormwater Management in Housing Development in Malaysia

Wet Detention Pond, Matahari Heights, Negeri Sembilan

Observation :

1. Pond – cater runoff from Matahari Heights & Tmn Seri Pagi
2. Source of pollution – shop houses, residential area, STP, etc.

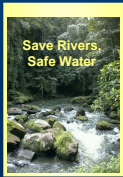


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Wet Detention Pond, Matahari Heights, Negeri Sembilan



Discharge from shop houses area

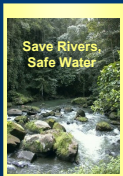


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Wet Detention Pond, Matahari Heights, Negeri Sembilan



Discharge & rubbish dumping from residential areas

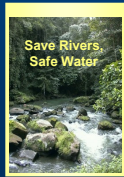


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Wet Detention Pond, Matahari Heights, Negeri Sembilan



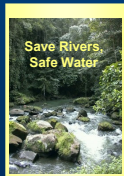
Discharge from STP



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Recommendations & Conclusions

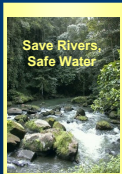
- No doubt, flood detention and retention systems (ponds, OSD & rainfall harvesting) have provided substantial benefits in controlling stormwater runoff quantity and quality;
- Thorough hydrological and hydraulic analysis are required to avoid any adverse impact of detention ponds at downstream river stretches although generally they will improve rather than aggravate the situations;
- Should control all the point source pollutions from discharging directly into the ponds without any treatments;
- Regular checks on the ponds, OSD and rainfall harvesting tank conditions by local authorities and relevant authorities to ensure the functionality and safety of them
- Allocate enough budget for the maintenance of the systems



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Recommendations & Conclusions

- Awareness campaigns and capacity buildings to ensure the systems are managed and maintained appropriately
- Flood detention ponds should be integrated into the development as one of the landscape, recreational and community areas
- Community involvement is important to establish the sense of belonging and the long term sustainability of the systems



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Recommendations & Conclusions



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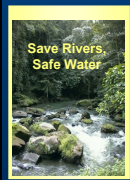
Recommendations & Conclusions

**BEST MANAGEMENT PRACTICES (BMP) PROJECT -
USE OF WET DETENTION PONDS AS COMMUNITY
PARKS AT TAMAN MATAHARI HEIGHTS, SEREMBAN
NEGERI SEMBILAN**



**SWaM 2019 - The Detention and Retention Ponds - "A Bone or Bane for Stormwater Management
in Housing Development in Malaysia**

THANK YOU



**SWaM 2019 - The Detention and Retention Ponds - "A Bone or Bane for Stormwater Management
in Housing Development in Malaysia**