National Conference on Stormwater Management
1-4 Oktober 2019 | The Light Hotel, Penang

“Erosion and Sediment Control Approach”

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Contents

1. Introduction
   - Surface Water & ESC in Malaysia

2. Barriers in ESC
   - Issues & Challenges in ESCP

3. Enablers of ESC
   - Our Approach & Implementation

4. Way Forward
   - Future prospect

5. Conclusion
   - Our expectation
Malaysia Water Scenario

Peninsular Malaysia
- Precipitation: 2496 mm
- Evaporation: 170 BCM (51%)
- Groundwater: 20 BCM (6%)
- Surface Runoff: 141 BCM (43%)
- Available for use: 21 BCM (15%)
- Total Surface Runoff: 495.71 BCM

Sarawak
- Precipitation: 3640 mm
- Evaporation: 156 BCM (34%)
- Groundwater: 30 BCM (7%)
- Surface Runoff: 268 BCM (59%)
- Available for use: 40 BCM (15%)

Sabah
- Precipitation: 2560 mm
- Evaporation: 88 BCM (47%)
- Groundwater: 14 BCM (7%)
- Surface Runoff: 87 BCM (46%)
- Available for use: 13 BCM (15%)

Total Consumptive Water Demand in 2020
- Peninsular Malaysia: 13.7 BCM
- Sarawak: 2.1 BCM
- Sabah: 1.4 BCM

Source: NWRS 2010-2050
Malaysia Water Scenario
(Surface Runoff vs Water Intake(WI) & Suspended Solid Class)

<table>
<thead>
<tr>
<th>State</th>
<th>Water Intake (MCM)</th>
<th>WI: Class I, II, III, IV, V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perlis</td>
<td>380</td>
<td>2: Class III</td>
</tr>
<tr>
<td>Kedah</td>
<td>7,120</td>
<td>11: Class I(1), II(2), III(3)</td>
</tr>
<tr>
<td>Pulau Pinang</td>
<td>830</td>
<td>1: Class I</td>
</tr>
<tr>
<td>Perak</td>
<td>20,820</td>
<td>8: Class I(5), II(2), III(1)</td>
</tr>
<tr>
<td>Selangor</td>
<td>6,380</td>
<td>3: Class I(1), III(1), IV(1)</td>
</tr>
<tr>
<td>Negeri Sembilan</td>
<td>3,280</td>
<td>Tiada WI</td>
</tr>
<tr>
<td>Melaka</td>
<td>950</td>
<td>1: Class III</td>
</tr>
<tr>
<td>Johor</td>
<td>21,900</td>
<td>7: Class I(2), II(4), III(1)</td>
</tr>
<tr>
<td>Pahang</td>
<td>39,750</td>
<td>8: Class I(4), II(2), III(2)</td>
</tr>
<tr>
<td>Terengganu</td>
<td>22,030</td>
<td>1: Class II</td>
</tr>
<tr>
<td>Pahang</td>
<td>39,750</td>
<td>8: Class I(4), II(2), III(2)</td>
</tr>
<tr>
<td>Sabah</td>
<td>86,890</td>
<td>3: Class I(2), V(1)</td>
</tr>
<tr>
<td>Sarawak</td>
<td>267,570</td>
<td>6: Class I(2), II(3), III(1)</td>
</tr>
<tr>
<td>Kelantan</td>
<td>17,670</td>
<td>3: Class I(1), II(1), III(1)</td>
</tr>
</tbody>
</table>

Legend:
- 1500 – 2000 (mm)  
- 2001 – 2500 (mm)  
- 2501 – 3000 (mm)  
- 3001 – 3500 (mm)  
- 3501 – 4000 (mm)

Parameter
- Total Suspended Solid (mg/L)
  - Class I: <25
  - Class II: 25-50
  - Class III: 50-150
  - Class IV: 150-300
  - Class V: >300

Note: Surface Runoff refer to National Water Resources Study (NWRS 2010 – 2050)
The deteriorations in river water quality due to the suspended solids pollution by inefficient control against improper earthworks and land clearing activities in certain areas
A plan that details temporary measures that will be implemented during the construction phase and may include permanent measures that will remain in place once development is complete to control the environmental impacts of erosion and sedimentation.

Runoff Management Control
Emphasize on ground covers (vegetation, riprap, mulch, and blankets) that prevent any of the types of erosion from occurring.

Sediment Control
Prevent soil particles that are already being carried in storm waters from leaving the site and entering streams or rivers.

Statutory Controls
- Hill Land
- Forestry
- Mining
- Quarries
- River & Stream
- Town Planning
- Fisheries

ESCP IN MALAYSIA

Impact of Poor Erosion & Sediment Control

- Dust Pollution
- Severe Erosion
- Land slide

- Mud Flood
- Waterways Pollution
- Sedimentation reduce river capacity
BARRIERS IN ESC IMPLEMENTATION

- Poor Enforcement on ESC
- Weak Laws related ESC
- High Agriculture Water Usage (56% of total Demand)
- Poor Knowledge & Skills in ESC
- Poor Design, Implementation & Audit (non-compliance to MSMA / ESCP)

- River Pollution & Mud Flood (27% of monitored river is polluted by suspended solids)
- ESCP not mandatory on project < 1 ha (not implemented)
- Multiple Enforcement Authorities
  - EIA project by DOE
  - Non EIA project by local government
- Improper Maintenance of ESCP BMP’s
- Paymaster Syndrome (consultant dilemma)
- Cost Limited Design (non-compliance to MSMA / ESCP)

- Maintenance practices contrary to ESC requirements (hill turfing, grass cutting, soil exposure & use of coagulants)
- No regular maintenance (inspect within 48 hours after >15mm rainfall)
- Profit based Design (non-compliance to MSMA / ESCP)
ENABLERS OF ESC

<table>
<thead>
<tr>
<th>DID produced manual &amp; guidelines to handle ESCP</th>
<th>DOE &amp; Local Government handling ESCP violation by enforcement</th>
<th>DOE-DID Enforcement &amp; Ops Lumpur (Local Government &amp; DID)</th>
<th>Water Resources Act (RUU), a holistic water law</th>
<th>Debris &amp; Mudflow Warning Model</th>
<th>Capacity Building through certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Saliran Mesra Alam (MSMA), Guidelines for ESCP,</td>
<td></td>
<td>DOE &gt;50 ha Local Gov &lt;50Ha</td>
<td>Implement IWRM &amp; IRBM approaches to control river pollution</td>
<td>Gives warning 3-4 hours before a mudflow event &amp; landslide at hill areas (Cameron Highland)</td>
<td>CPESC – 124 ESC professionals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DOE-DID Enf. &gt;50 ha Local Gov &amp; DID &lt;50Ha</td>
<td></td>
<td></td>
<td>CPSWQ – 6 water quality professional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CISEC – 26 ESC inspector</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>CESSWI – 144 storm water inspector</td>
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</table>

State Government is responsible for **water, rivers**, land, and forest including gazetting the water catchment areas and control of development in the states.

State Government **control** and **regulate** on the ground pertaining to IWRM, while Federal Government promoting legislations uniformity, providing financial support, technical advice and capacity building with **IWRM** approach.
DID as the technical expertise produced manual & guidelines to indulge the long term nationwide directions and needs in ensuring sustainable urban drainage systems and stormwater managements.

Cabinet gave full approval and directive for this manual to be referred and followed by every development project starting from 1st January, 2001.

The utilization of ESCP for developed areas becomes compulsory since October 2005 after being endorsement by the National Council for Local Government (MNKT).
ESC ENFORCEMENT

- Need to submit ESCP & Earthwork Plan
- Monitored by Local Authority & DID through OPS
  Lumpur Task Force
- Enforcement by Local Authority using Local Authorities Act

- Need to submit EIA including ESCP & Earthwork
- Mostly Monitored by Department of Environment (DOE)
- DOE-DID Enforcement platform for DID to monitor the selected projects (Devolution of Power)
- Enforcement by DOE using Environmental Quality Act, 1974
WATER RESOURCES ACT

Model Law
Holistic water law to implement IWRM & IRBM approaches
In consultation stage with stakeholders

Water Resources Act

Kedah Water Resources Enactment 2008
- Includes Sustainable Agricultural

Selangor Water Management Authority Enactment 1999
- Power to regulate, gazette and impose work order

Sabah Water Resources Enactment 1998
- Integrated Catchment Management

Main objectives

Provide advance warning to the public and relevant agencies for disaster relief on the possibility of occurrence of an impending landslide or mudflow in high-risk and sensitive areas, like cut shapes of highway and recreation areas.

- Debris flows are a common type of fast-moving landslide that generally occurs during intense rainfall on water-saturated soil.
- They usually start on steep hillsides as soil slumps or slides that liquefy and accelerate to speeds as great as 10 -30 Km per hour or more.
- They continue flowing down hills and into channels and deposit sand, mud, boulders and organic material onto more gently sloping ground.
- Their consistency ranges from watery mud to thick, rocky mud (like wet cement), which is dense enough to carry boulders, trees, and cars.
- Debris flows from many different sources can combine in channels, where their destructive power may be greatly increased.
<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion and Sediment Control</td>
<td>124</td>
<td>A Certified Professional in Erosion and Sediment Control (CPESC) embraces the science of surface erosion and sediment control.</td>
</tr>
<tr>
<td>Water Quality Professionals</td>
<td>6</td>
<td>Professionals with a comprehensive knowledge &amp; understanding of stormwater and erosion control regulations.</td>
</tr>
<tr>
<td>Erosion and Sediment Control Inspectors</td>
<td>26</td>
<td>Inspection Professionals with a Comprehensive Knowledge &amp; Understanding of Controlling sediment and erosion and storm water pollutants</td>
</tr>
<tr>
<td>Storm Water Inspectors</td>
<td>144</td>
<td>Inspection Professionals with a Comprehensive Knowledge &amp; Understanding of Erosion, Sediment and Stormwater Regulations.</td>
</tr>
</tbody>
</table>
Dealing pollution using traditional ‘end of pipe’ treatments is expensive, energy-intensive and unsustainable. We’re calling for an approach that tackles pollution at source. Reducing pollution by changing the way land is managed offers a better deal for both water customers and the environment.

(Source: https://nt.global.ssl.fastly.net)

The proposed Act is expected to protect the water resources in Malaysia & with the support & commitments of the state governments, would create uniformity in our approach in managing our water resources. With this act in place, it allows deterrent enforcement to be carried out to keep our waterways clean.

Contractor has to deposit a certain amount of estimated cost of project to the project owner or developer for the purpose of ESC planning, design, installation, maintenance, training & monitoring and to convert the BMP’s into permanent structure.

Education and awareness at all levels (contractor/consultant/clients) including farmers and agriculture land developers and project less than 1 ha to improve & implement ESC in their projects. This includes capacity building among consultants & enforcement officers.
CONCLUSION

Erosion and sediment control to be done in a integrated manner since many parties are involved.

DID don’t have the enforcement but we shall never stop to get the issues of pollution and ESC to the related agencies and ensuring their actions.

We are going towards a water ready nation, therefore, pollution by suspended solid need to be taken seriously which could effect the national water security.

Existing law related to ESC need to be reviewed to strengthen the enforcement.