

# Flood Policies/Stormwater Management

## Guam Standard Design Criteria in Stormwater Management



# **Overview**

**1.) 2006 CNMI & Guam Stormwater  
Management Manual (Vol. 1 and Vol. 2)**

**2.) 2010 Guam Transportation Stormwater  
Drainage Manual**



## GUAM TRANSPORTATION STORMWATER DRAINAGE

AUGUST 2011



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Volume I

## CNMI and Guam Stormwater Management Manual

Final - October 2006



Prepared by:  
Horsley Witten Group, Inc.



Prepared for:  
Commonwealth of the Northern Mariana Islands  
and the Territory of Guam

Volume II

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# Design Standard Sizing Criteria of Both Manuals

| CNMI & Guam Stormwater Management Manual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Guam Transportation Stormwater Drainage Manual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| <b>BMP design sizing criteria for Post-Construction requirements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p><b>uses unified sizing approach for treatment criteria:</b></p> <ul style="list-style-type: none"> <li>• <b>Recharge criteria</b>-using 1.5 precipitation for limestone and based on hydrologic soil group recharge rate for volcanic dominated regions</li> </ul> <p><b>Note: Stormwater runoff from hotspot area are not allowed to infiltrate into the groundwater without 100 % pre-treatment</b></p> <ul style="list-style-type: none"> <li>• <b>Water Quality</b>- 80 % rule discharge to moderate water quality and 90 % rule discharge to high quality waters and hotspots or 0.8 inch and 1.50inches precipitation respectively</li> <li>• <b>Channel Protection</b>-24 hours extended detention of post-developed 1-year, 24-hour rainfall event</li> <li>• <b>overbank Flood Control (Qp-25)</b>-control peak discharge from 25 year storm to 25 year pre-development rates. <b>(25 yr, 24 hr storm event which is 20 inches per Lander 2004)</b></li> </ul> | <ul style="list-style-type: none"> <li>• Uses Rational Method or rainfall event return frequency approach for sizing BMPs</li> <li>• Establishes that the post-development discharge rates must not exceed pre development peak discharge rates for the <b>25-yr, 1-hr storm event (~2.5 inches)</b>. Detention volumes for the 25-yr, 1-hr storm event should be emptied within a 72-hr period from the start of the design storm event.</li> <li>• The stormwater quality volume to be treated in accordance with the runoff from a storm event that corresponds to the 90th or 80th percentile amount of total annual average rainfall. The <b>80%</b> corresponds to <b>56 percent of the 2-yr, 1-hr storm</b> precipitation depth, whereas the <b>90 %</b> corresponds to <b>72 percent of the 2-yr, 1-hr storm</b> precipitation depth, with a peak discharge not to exceed 25 year, 1 hr</li> </ul> |

| CNMI & Guam Stormwater Management Manual (C&GSMM)                                                                                                                                                                                                                                                                                                                                                                                                    | Guam Transportation Stormwater Drainage Manual (TSDM)                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Requirements are waived for Cpv and Qp-25 if the site directly discharges to the coastal waters, reservoirs, rivers or streams</li> <li>• Uses model TR 55 or approved equivalent for determining pre-treatment peak discharge rates</li> <li>• <b>The manual was developed based on available local data regarding rainfall, geology, hydrology and soils. Rainfall data by Dr. Mark Lander</b></li> </ul> | <ul style="list-style-type: none"> <li>• Flow based quality treatment BMPs be designed for the peak runoff flow rate from the 2-yr, 1 hr. storm event</li> <li>• Requirement are exempted in projects discharging runoff to coastal waters subject to tidal , conveyance system to surface waters, projects over water structures like bridges and large reservoir.</li> </ul>      |
| <ul style="list-style-type: none"> <li>• Composed of general performance standards 1-13 for stormwater management to help prevent adverse impacts of stormwater runoff</li> </ul>                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>BMP Treatment Criteria Standards for Construction</b>                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                     |
| <ul style="list-style-type: none"> <li>• Composed of general performance criteria E&amp;SC Standard 1-11 to help prevent adverse impacts during construction</li> <li>• 10 year frequency storm treatment criteria for all construction sites. Temporary sediment trap shall be designed to retain runoff minimum of 1.5" precipitation event or sediment basin with 5500 cu ft/acre minimum capacity</li> </ul>                                     | <ul style="list-style-type: none"> <li>• All temporary sediment trapping devices should be designed to treat run-off from a minimum of 3-year frequency storm</li> <li>• BMP standards varies based on rainfall and other factors</li> <li>• Guidelines are provided to determine which of the nine minimum requirements must be met for a given transportation project.</li> </ul> |

# Guam Stormwater Drainage Manual Current Update by ACOE in partnership with Gov Guam

- 2 manuals have different methods which create confusion amongst engineering industry
- GEPA and DPW agreed that the water quality and erosion and sediment control BMPs sizing and design criteria in C&GSMM are adequate and not need to be revised
- ACOE developed the simplified methodology tools, spreadsheet type, site stormwater calculations for projects, provided with design examples
  - The tools adopt or uses Dr. Landers (2004) rainfall data
  - Calculator tools goal is to provide an easy stormwater system design calculations for engineers,
  - calculator tools are found in BSP website

# In comparison between the 2 manuals for BMPs design criteria, shows some inconsistencies

- Strategies in resolving the Gaps in Stormwater Management in Guam (Guam EPA thoughts)
  - Resolve the apparent inconsistencies between the stormwater manuals. GEPA and DPW must decide which criteria has more stringent requirements to help resolve flooding and confusion.
  - Due to both manual are not governed by any regulations only through EO, policy/regulations update must consider adopting the manuals, to require the use and implementation.
  - Or maybe incorporate the 2 manuals to become one to help resolve issues of confusion.
  - Policy development, implementation and enforcement of post-construction stormwater management systems in Guam to include proper operation and maintenance and performance evaluation (which will serve as a data for future policy update.
  - Or maybe LID concept design for residential like rain garden system



Questions?

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Thank You...