RULES RELATING TO STORM DRAINAGE STANDARDS
RULES RELATING TO STORM DRAINAGE STANDARDS
Sections that underwent revision

§1-1 PURPOSE

§1-2 MODIFICATIONS

§1-3 DEFINITIONS

§1-4 SECTION I – STANDARDS FOR FLOOD CONTROL

§1-5 SECTION II – STORM WATER QUALITY

§1-6 REPEAL
These Rules address requirements for both storm runoff quantities for flood control as well as storm runoff quality and reflect the most recent changes to Federal, State, and County requirements related to the quality of storm water discharges. By establishing criteria to address water quality, the City and County of Honolulu is satisfying Federal Regulatory requirements to control the discharge of pollutants in storm water as specified in the Clean Water Act as amended by the Water Quality Act of 1987.

These standards are not intended to limit the initiative and resourcefulness of the engineer in developing drainage plans, or be viewed as maximum limits in design criteria. More stringent criteria should be used where reasonable.
A. The Director may modify provisions of these rules whenever:

1. The land to be developed is of such a size and shape or is affected by location or geological or topographical conditions, or is devoted to such uses that it is impractical or not economically achievable in the particular case to conform fully to these rules.

**was changed to:**

A. The Director may modify provisions of these rules whenever:

1. Full conformance to these rules is not achievable because of the size and shape, location or geological or topographical conditions, or land uses.
## §1-3, DEFINITIONS

<table>
<thead>
<tr>
<th>Terms Added</th>
<th>Terms Revised</th>
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<tbody>
<tr>
<td>Biofiltration</td>
<td>Redevelopment</td>
</tr>
<tr>
<td>Disturbed Area</td>
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<td>Evapotranspiration</td>
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<td>Impervious Surface</td>
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<td>Infiltration</td>
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<td>Low Impact Development</td>
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<td>New Development</td>
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<tr>
<td>Site Design Strategies</td>
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<tr>
<td>Source Control BMPs</td>
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<tr>
<td>Treatment Control BMPs</td>
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DISTURBED AREA

The area of the project that is expected to undergo any disturbance, including, but not limited to excavation, grading, clearing, demolition, uprooting of vegetation, equipment staging, and storage.
Areas **not** considered to be Disturbed

- Areas which are cleared, graded, and/or excavated for the sole purpose of landscape renovation
- Areas which are cleared, graded, and/or excavated for the sole purpose of growing crops
A surface covering or pavement of a developed parcel of land that prevents the land’s natural ability to absorb and infiltrate rainfall/storm water, including rooftops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering.
Land disturbing activities; structural development, including construction or installation of a building or structure, the creation of impervious surfaces; and land subdivision
Low-technology practices designed to prevent pollutants from contacting storm water runoff and/or prevent discharge of contaminated runoff to the MS4

- Stenciling storm drain inlets
- Grading dumpster, fueling, and storage areas to prevent run-on & runoff
- Using dumpsters with lids
- Paving high risk areas with concrete instead of asphalt
- Covering fueling and storage areas

Gas station, Kapolei, HI
Approved Source Control BMPs

- Landscaped areas
- Auto. irrigation systems
- Storm drain inlets
- Loading docks
- Parking areas
- Vehicle/equipment repair

- Vehicle/equipment fueling
- Vehicle/equipment washing/cleaning
- Outdoor trash storage
- Outdoor material storage
- Outdoor work areas
- Outdoor process equip. operations

Details for each are provided in Chapter 2 of the City’s Storm Water BMP Guide.
Vehicle/Equipment Fueling

- Cover with a roof or canopy
- Pave with Portland Cement Concrete
- Use fuel dispensing nozzles with automatic shutoffs
- Post signs warning against "topping off" of fuel tanks
Source Control

Loading Docks

- Cover all areas, or design them to preclude run-on and runoff.
- Do not allow runoff from depressed loading docks (truck wells) to discharge into storm drains.
- Grade to a drain that is connected to a dead-end.
- Pave with concrete instead of asphalt.
Outdoor Material Storage

• Place materials in an enclosure to prevent contact with runoff

• Slope the storage area towards a dead-end sump

• Direct runoff from downspouts/roofs away from storage areas

• Cover the storage area with an awning
**Outdoor Work Areas**

- Create an impermeable surface or use a metal drip pan
- Cover the area with a roof to prevent run-on
- Berm around the area perimeter to prevent run-on from adjacent areas
- Locate the work area away from storm drains or catch basins
REDEVELOPMENT

Development that would create or add impervious surface area on an already developed site, including expansion of a building footprint; addition to or replacement of a structure; replacement of an impervious surface that is not part of a routine maintenance activity; and land disturbing activities related to structural or impervious surfaces.
Activities **not** considered to be Redevelopment

- Routine maintenance activities to maintain original hydraulic capacity
- Routine maintenance activities to maintain original purpose of facility
- Emergency redevelopment activity required to protect public health and safety
- Impervious surface replacement, such as parking lot and roadway reconstruction, which does not disturb additional area
- Repaving of existing roads
§1-5.1, PART I – WATER QUALITY CRITERIA

Revised Subsections

§1-5.1.B.1, Development & Redevelopment Included
§1-5.1.B.3, Project Applicability
§1-5.1.B.6, Management Practices to Meet Criteria
§1-5.1.B.10, Storm Water Quality Facilities Review
§1-5.1.B.11, Maintenance

Deleted Subsections

§1-5.1.C, Detention Based WQ Control
§1-5.1.D, Flow-Through Based WQ Control
§1-5.1.E, Detention Combined with Flow-Through Treatment
§1-5.1.F, Flow-Through Upstream of Detention Treatment

New Subsections

§1-5.1.B.2, Regulated Projects
What the Rules now specify

- Rules apply to all projects as defined in §1-5.1.B.2

- BMP sizing requirements apply to all new development projects that disturb at least 1 acre during construction

- BMP sizing requirements apply to all redevelopment projects that disturb at least 1 acre during construction

- Rules only apply to the addition of the redevelopment
Projects are classified as follows:

<table>
<thead>
<tr>
<th>Priority</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Disturb ≥ 5 acres of land during construction</td>
</tr>
<tr>
<td>A2</td>
<td>Disturb 1 - 5 acres of land during construction</td>
</tr>
<tr>
<td>B</td>
<td>Disturb &lt; 1 acre during construction, create at least 10,000 sq-ft of total impervious surface, and is a Retail Gas Station, Auto Repair Shop, Restaurant, or Parking Lot</td>
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</table>
What the Rules now specify

The Director may exempt projects from the application of these rules if projects are determined to have submitted substantially completed construction drawings and substantially completed site-specific drainage reports prior to June 1, 2013.
What the Rules used to specify

- Post-Construction Treatment Control BMPs
- BMP at owner’s discretion

What the Rules now specify

- Combination of multiple management practices based on the project’s Priority
- BMP at owner’s discretion (partially)
Priority A1 Projects (disturb ≥ 5 acres)

- All applicable Site Design Strategies
- All applicable Source Control BMPs
- Unless infeasible, retain with LID Retention BMPs, the Water Quality Volume (WQV)
- Unless infeasible, biofilter with LID Biofiltration BMPs, any portion of the WQV not retained
- Alternative Compliance if WQV is not retained or biofiltered
Priority A2 Projects (disturb 1 – 5 acres)

- All applicable Site Design Strategies
- All applicable Source Control BMPs
- Unless infeasible, retention or biofiltration of WQV
- Alternative Compliance if WQV is not retained or biofiltered

Priority B Projects

- Consider implementing LID Site Design Strategies
- All applicable Source Control BMPs
§1-5.1.B.6 references some other new terms:

- Water Quality Volume
- Infeasible
- Alternative Compliance
Water Quality Volume (WQV)

- Volume of runoff generated by a pre-determined precipitation event (the Water Quality Design Storm, or WQDS) that must be managed for water quality

- The City selected 1 inch as the WQDS

**WQDS at Oahu Federal Facilities**
How is Infeasibility Determined?

- Pre-established criteria for all Retention and Biofiltration BMPs

- Based on a review and analysis of other municipalities and state/federal agencies

- Exemption from a specific LID BMP may be claimed if at least one criterion for the BMP is met

- Applicant may propose for City approval a criterion not listed
**Alternative Compliance Options**

1. Either Harvest/Reuse or Treat on-site with non-LID BMPs, any portion of the WQV that is not retained or biofiltered
   - Detention Basin
   - Sand Filter
   - Manufactured Treatment Device

2. Retain or biofilter at an offsite location, the volume of runoff equivalent to the portion of the WQV that was not retained and/or biofiltered on-site
   - Proposed location must be approved by City
   - Applicant responsible for all costs, including maintenance
What the Rules now specify

• SWQR (Storm Water Quality Report) required for Priority A1 Projects
  • A SWQR presents a project’s storm water quality issues and storm water quality management strategy, in a standard report format

• SWQC (Storm Water Quality Checklist) required for Priority A2 & Priority B Projects
  • A SWQC presents a project’s storm water quality management strategy, in a simple checklist format
§1-5.1.B.10, STORM WATER QUALITY FACILITIES REVIEW

SWQR & SWQC Specifics

- Signed by Owner & Licensed Architect/Engineer
- Submittal Requirements

<table>
<thead>
<tr>
<th></th>
<th>SWQR (Priority A1)</th>
<th>SWQC (Priority A2)</th>
<th>SWQC (Priority B)</th>
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</thead>
<tbody>
<tr>
<td>Construction Plan Approvals</td>
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<td></td>
</tr>
<tr>
<td>Building Permit Applications</td>
<td></td>
<td></td>
<td>✓</td>
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- WQ management strategy must be included in Master Plan, Discretionary Land Use Permit, or EA/EIS
- More details in Module 3...
What the Rules now specify

- Maintenance details specified in SWQR/SWQC, as applicable
- Treatment Control BMPs must be maintained regularly and inspected annually prior to rainy season
- Maintenance Activity Log must be kept for 5 yrs
Subsections A-D replaced in their entirety with:

§1-5.2.A Volume Based Storm Water Quality Control Facilities

§1-5.2.B Flow Based Storm Water Quality Control Facilities

§1-5.2.C Area Based Storm Water Quality Control Facilities

§1-5.2.D Demand Based Storm Water Quality Control Facilities
Volume-based BMPs shall be sized for the WQV:

\[ WQV = PCA \times 3630 \]

Where: 
- \( WQV \) = water quality volume (cubic feet)
- \( P \) = WQDS runoff depth (inches) = 1 inch
- \( C \) = volumetric runoff coefficient (unitless)
- \( A \) = drainage area (acres)

The volumetric runoff coefficient is calculated by:

\[ C = 0.05 + 0.009I \]

Where: 
- \( C \) = volumetric runoff coefficient
- \( I \) = % impervious cover, expressed as a percentage
Flow-through based BMPs shall be sized for the WQF:

\[ WQF = CiA \]

Where:  
WQF = water quality flow rate (cubic feet per second)  
C = runoff coefficient (unitless)  
i = peak rainfall intensity (inches per hour)  
A = total drainage area (acres)

• A Peak rainfall intensity of 0.4 in/hr shall be used
• For drainage areas containing multiple land uses, a composite weighted runoff coefficient should be used.

Vegetated Swale  
Vegetated Buffer Strip  
Tree Box Filter  
Manufactured Treatment Device
Area based BMPs shall be sized such that:

- The size of the vegetated area receiving the roof runoff is at least 10% of the size of the roof area that drains to the downspout

or

- The flow path of the vegetated area receiving the roof runoff is at least as long as the flow path of the roof area that drains to the downspout
Demand based BMPs shall be sized such that:

- At least 80% of the total annual runoff is captured
- At least 80% of the total annual reuse demand is met
Module Summary
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**SUMMARY – STORM WATER MANAGEMENT REQUIREMENTS**

**Priority A1**

1. **LID SITE DESIGN**
2. **SOURCE CONTROL**
3. **RETENTION**
   - Is WQV retained on-site? [DONE]
   - Is it infeasible to retain WQV? [QR]
4. **BIOFILTERATION**
   - Is WQV retained or biofiltered? [DONE]
   - Is it infeasible to retain or biofilter WQV? [QR]
5. **ALTERNATIVE COMPLIANCE**

**Priority A2**

1. **LID SITE DESIGN**
2. **SOURCE CONTROL**
3. **RETENTION/BIOFILTERATION**
   - Is WQV retained or biofiltered? [DONE]
   - Is it infeasible to retain or biofilter WQV? [QR]
5. **ALTERNATIVE COMPLIANCE**
Priority B

- Consider LID Site Design
- Source Control
- Done
### SUMMARY – DOCUMENTATION REQUIREMENTS

<table>
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<tr>
<th>Priority</th>
<th>Document</th>
<th>Submittal Requirements</th>
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<tr>
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<td><strong>Building Permit Apps.</strong></td>
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<td>B</td>
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<td>✓</td>
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</table>
• Maintenance activities and responsibility specified in SWQR/SWQC, as applicable

• Treatment Control BMPs must be maintained regularly and inspected annually prior to rainy season (November 1)

• Maintenance Activity Log must be kept on file for 5 yrs
## BMP Sizing Criteria

<table>
<thead>
<tr>
<th>BMP Type</th>
<th>Sizing Criteria</th>
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<tbody>
<tr>
<td>Volume Based</td>
<td>WQV with rainfall depth of 1 inch</td>
</tr>
<tr>
<td>Flow Based</td>
<td>WQF with rainfall intensity of 0.4 in/hr</td>
</tr>
<tr>
<td>Area Based</td>
<td>10% of contributing area or 100% of contributing flow path</td>
</tr>
<tr>
<td>Demand Based</td>
<td>80% of total annual runoff is captured and 80% of total annual reuse demand is met</td>
</tr>
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</table>
End of Module 2