PLAN TO INCORPORATE
LOW IMPACT DEVELOPMENT STANDARDS

HONOLULU INTERNATIONAL AIRPORT
NPDES PERMIT NO. HI S000005

Prepared For:
DEPARTMENT OF TRANSPORTATION, AIRPORTS DIVISION
Honolulu International Airport
400 Rodgers Boulevard, Suite 700
Honolulu, Hawaii 96819-1880

September 2014

Version 1.0

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

The State of Hawaii, Department of Transportation, Airports Division's (DOTA) will implement low impact development (LID) standards as required in Part D.1.e.(1) of the National Pollutant Discharge Elimination System (NPDES) Permit HIS000005 for the Honolulu International Airport (HNL) Small Municipal Separate Storm Sewer System (MS4). The LID standards will become a part of the Permanent Post-Construction Best Management Practices (BMP) Manual that is currently included as Section D of the HNL Storm Water Management Program Plan (SWMPP) and will be incorporated as a part of the construction plan review process for sites requiring permanent BMPs.

1.1 LID Definition

For the purposes of this plan, LID refers to storm water management practices which seek to mimic predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating storm water runoff close to its source. LID employs principles such as preserving and re-creating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats storm water as a resource, rather than a waste product.

The City and County of Honolulu (CCH) has provided five basic strategies for LID designs in their *Storm Water BMP Guide*. These strategies include:

- Conserving Natural Areas, Soils, and Vegetation.
- Minimizing Disturbances to Natural Drainages.
- Minimizing Soil Compaction.
- Minimizing Impervious Surfaces.
- Directing Runoff to Landscaped Areas.

1.2 DOTA Goals

DOTA has previously compiled a list of "preferred" BMPs that describes the applicable goals for Designers to consider when selecting post-construction or permanent BMPs. The first goal is to retain as much runoff on-site as feasible, keeping in consideration the mission of the airport and applicable Federal Aviation Administration rules. The secondary goal is to ensure that runoff that must be conveyed offsite is provided with treatment prior to entering receiving waters. The list of preferred BMPs and SWMPP is available online at: http://hidot.hawaii.gov/airports/doing-business/engineering/environmental/construction-site-runoff-control-program/. The purpose of both goals is to reduce the pollution associated with storm water runoff from new development and redevelopment at the airport.

2.0 APPLICABILITY CRITERIA

Low Impact Development (LID) standards shall be applicable to all construction projects disturbing at least one (1) acre and smaller projects that have the potential to discharge pollutants to the DOTA Small MS4.

2.1 Project Priority

DOTA Projects and Tenant Improvement Projects for new development and redevelopment will be prioritized as follows for purposes of LID implementation.

- **Priority A Projects.** All projects disturbing at least one acre of land.
- **Priority B Projects.** All projects disturbing less than one acre of land and have the potential to discharge pollutants to the DOTA Small MS4. Specific examples include:
    - Retail Fueling facility with at least 10,000 square feet of total impervious area.
    - Aircraft, Vehicle, or Equipment Maintenance or Repair facility with at least 10,000 square feet of total impervious area.
    - Building or Parking Lot with at least 10,000 square feet of total impervious area.

    Note: impervious surfaces include, but are not limited to, rooftops; sidewalks; driveways, parking lots; areas of concrete or asphalt pavement; and any other continuous watertight pavement or covering.

2.2 Implementation Process

Required projects will first consider LID site design strategies to the maximum extent practicable (MEP). Then the project will consider source control BMPs and treatment control BMPs to prevent the discharge of pollutants from post-construction activities. If permanent BMPs are not feasible, Sustainable High Performance Guidelines may be applied. These considerations will be documented on the Design Review Checklist or the Less Than One Acre Form available in SWMPP Section C.

3.0 QUANTITATIVE CRITERIA DEVELOPMENT

DOTA has investigated the development of quantitative criteria for Designers to implement when including LID designs in their plans. DOTA plans to reference the City and County of Honolulu (CCH) *Rules Relating to Storm Water Standards*, which provides specific guidance for both volume-based and flow-based designs.

3.1 Volume-Based Designs

Volume based designs include those that will hold a set volume of runoff such as infiltration basins/trenches, evaporation ponds, underground detention/infiltration systems, dry wells, permeable pavement, green roofs, vegetated bio-filters, and sand filters. The design must hold 1 inch of runoff and shall be sized based on the following equations:

$$WQV = PCA \times 3630$$

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

$$C = 0.05+0.009I$$

Where:
- C = volumetric runoff coefficient
- I = percent of impervious cover, expressed as a percentage

Note that DOTA conducted an independent study to re-verify the CCH selection of the 1 inch requirement for a 24-hour 85th percentile storm event. DOTA observed that data obtained for the Honolulu International Airport supported the selection of a 1 inch design depth to address the 24 hr, 85% storm (Table 1).

TABLE 1: 24-HOUR 85TH PERCENTILE RAINFALL DEPTH

Station Name	Monitoring Dates	Number of Runoff Events	Average Rainfall (in)	85th Percentile Storm (in)
Honolulu International Airport 703	6/1/1975 to 7/30/2013	1011	0.569	0.961

3.2 Flow-Based Designs

Flow-based designs include those that will move storm water through a system that also provides for the removal of potential pollutants. Examples of flow-based designs include vegetated swales, vegetated filer strips, and manufactured treatment devices. The design must be able to accommodate a peak rainfall intensity of 0.4 inches per hour, based on the following equations:

$$WQF = CiA$$

Where:
- WQF = water quality flow rate (cubic feet per second)
- C = runoff coefficient (Table 1)
- I = peak rainfall intensity (inches per hour) = 0.4
- A = total drainage area (acres)

TABLE 2: RUNOFF COEFFICIENTS

Type of Drainage Area	Runoff Coefficient
Light Industrial	0.5 – 0.8
Heavy Industrial	0.6 – 0.9
Roofs	0.75 – 0.95
Asphalt and Concrete Pavement	0.70 – 0.95
Unimproved Areas	0.1 – 0.3

Note: Data source from City and County of Honolulu, *Rules Relating to Storm Water Standards.*

4.0 LID WAIVER CRITERIA

DOTA recognizes that it may not be feasible for certain projects to meet the LID requirements and in these instances a waiver may be granted. The feasibility criteria for issuing waivers is based on, but not limited to:

- Legal / safety constraints – e.g. applicability with Federal Aviation Administration regulations or airport rules and regulations.
- Physical constraints – e.g. space constraints; site slope angles; contaminated subsoil.
- Hydrogeological constraints – e.g. permeability; depth to groundwater; slope stability; structural impacts to structures.
- Operational constraints – e.g. strength/loading requirements for pavement; no application for water reuse.

Types of projects that qualify for waivers from LID will be at the discretion of DOTA and may include, but are not limited to:

- Projects which return the area to pre-development runoff conditions.
- Safety projects and/or improvements.
- Maintenance projects such as:
    - Resurfacing or replacement of damaged pavement.
    - Trenching and resurfacing associated with utility work.

Waiver approval will be documented by DOTA on the Design Review Checklist or the Less Than One Acre Form found in SWMPP Section C.

4.1 Other Permanent BMP Methods

For projects that are granted an LID requirement waiver, other permanent BMP methods should be considered per the DOTA Permanent Post-Construction BMP Manual in SWMPP Section D. This may include applying the Sustainable High Performance Guidelines, source control BMPs, and/or treatment control BMPs. Specific alternatives will be discussed with DOTA during the construction plan review process.

5.0 REFERENCES

- The City & County of Honolulu, Department of Environmental Services. November 2011. *Best Management Practices Manual for Construction Sites in Honolulu*.
- The City & County of Honolulu, Department of Environmental Services. January 2000, Revised June 2012. *Rules Relating to Storm Drainage Standards.*
- City and County of Honolulu, Department of Planning and Permitting. December 2012. *Storm Water BMP Guide.*
- State of Hawaii, Department of Transportation, Airports Division. March 14, 2014. *National Pollutant Discharge Elimination System, Permit Number HI S000005*.
- State of Hawaii, Department of Transportation, Airports Division. October 2013 and December 2013 (respectively). *Storm Water Management Program Plan, Section C and D.*
- State of Hawaii, Department of Transportation, Highways Division. March 2014. *Post Construction Storm Water Management in New Development and Redevelopment Plan to Incorporate Low Impact Development.*