DOT Airports Division Post-Construction Best Management Practice Manual Updates and Implementation

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Post-Construction Best Management Practice Manual

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November 2021

Agenda

- Goals
- Post-Construction Best Management Practice Manual Updates
  - General – Outline, Appendices, and AMS
  - Project Requirements
  - FAA Limitations and PBMP Variance
  - LID PBMP Infeasibility and Waiver
  - PBMP Implementation
  - PBMP Design Criteria
- Post-Construction Best Management Practice Manual Implementation Schedule


Goals

Goals

- Provide guidance to designers for PBMP and LID implementation
- Revisit the PBMP implementation criteria
- Establish a clear and consistent approach for PBMP including LID implementation
- Develop a documented process to grant a variance/waiver
- Promote LID PBMPs while also considering the mission of DOTA, to ensure aircraft and public safety per FAA regulations which prohibit building habitats for wildlife
- Streamline the selection of appropriate PBMPs

Goals

- Update the PBMP design criteria to ensure they are consistent with the HNL Small MS4 Permit and county regulations
- Provide PBMP sizing calculations
- Reevaluate the Operations & Maintenance (O&M) considerations for the various PBMPs
- Develop DOTA's AMS (Veoci) to include the PBMP design review as well as inventory, inspection, and maintenance of PBMPs at DOTA airports Statewide

Post-Construction BMP Manual Updates

Outline

1. Introduction

Provides a general review of the Background and Regulatory Requirements.

2. Post-Construction BMP Applicability

Provides overview of which projects requires PBMPs and how a project qualifies for a Variance.

3. Post-Construction BMP Implementation

Provides requirements on LID PBMP requirements, infeasibility criteria, and how a project qualifies for an LID Waiver. Discusses the various types of PBMPs.

4. PBMP Design Criteria

Discusses pollutants of concern, acceptable PBMPs, sizing criteria, design process, PBMP O&M requirements, and information needed for PBMP review

5. Inspections, Operations, and Maintenance

Provides an overview of how DOTA maintains its AMS to track PBMP inventory, inspection, and maintenance.

6. References and Resources

Provides references and resources used to develop this manual.

Appendices

Discussed on the next slide.

Appendices

FAA Exemption Zone for PBMP Installation Statewide Maps

Appendix I

LID PBMP Design Fact Sheets

Appendix II

LID Waiver and Infeasibility Screening Worksheet

Appendix III

Source Control PBMP Design Fact Sheets

Appendix IV

Treatment Control PBMP Design Fact Sheets

Appendix V

Evaporation Rates and Rainfall Data for Statewide Airports

Appendix VI

PBMP O&M Fact Sheets

Appendix VII

Appendix II - LID PBMP Design Fact Sheets

- PBMP Category
- Pollutants Targeted
- Description
- Limitations
- Design Guidelines
- Construction Considerations
- Example Schematics

Appendix IV - Source Control PBMP Design Fact Sheets

- PBMP Category
- Pollutants Targeted
- Description
- Approach
- Suitable Applications
- Limitations
- Design Considerations
- Construction Considerations
- O&M Recommendations

Appendix V - Treatment Control PBMP Design Fact Sheets

- PBMP Category
- Pollutants Targeted
- Description
- Limitations
- Design Guidelines
- Construction Considerations
- Example Schematics

Appendix VII - PBMP O&M Fact Sheets

- Inspection Procedures
- Conditions That Warrant Maintenance
- Maintenance Procedures

Asset Management System (AMS)

- DOTA will use AMS (Veoci) for the Construction Design Review process including PBMPs
  - Veoci module for construction design review is under final development review
- Project proponents shall use Veoci to undergo the Construction and PBMP design review process
  - Apply for PBMP Variance and receive approval
  - Apply for LID PBMP Waiver and receive approval
  - Submit PBMP design documentation (plans, specs, O&M Plan etc.)
  - Address DOTA comments and receive acceptance

Post-Construction BMP Manual Updates – Project Requirements

Exempt Projects

- Projects that do not meet the DOTA definition of construction activity and certain types of activities are exempt from the Construction Design Review process according to DOTA's Construction Site Runoff Control Program, and are therefore exempt from PBMP review
  - Example would be building interior renovations with no land disturbance

PBMP Implementation

- Clear and consistent approach for PBMP implementation
  - Project requiring PBMPs including consideration of PBMPs for small projects
  - Variance from PBMPs based on FAA safety limitations
- Documented process using the AMS to grant a variance from PBMP implementation

Projects Requiring PBMPs

- Construction activities that disturb an area of one acre or more
- Smaller projects that have potential to discharge pollutants to the DOTA MS4, drainage system, or State waters that involve one or more of the following:
  - Steep earthen slopes (i.e. grade of >20% or more)
  - Modifying, replacing, or installing new drainage structures, as appropriate
  - Parking lots and buildings adding 5,000 ft^2 or more of impervious area
  - Aircraft, vehicle, or equipment washing areas
  - Aircraft, vehicle, or equipment fueling areas or container and material storage areas

Post-Construction BMP Manual Updates – FAA Limitations & PBMP Variance

FAA Limitations and PBMP Exclusions

- FAA regulations define several on-airfield operational zones that ensure the safety of airfield operations should aircraft deviate from the defined runway and taxiway surfaces
- FAA mandates protection zones for near-airfield areas to ensure the protection of aircraft approach and departure airspace
- FAA specified on-airfield and near-airfield zones related to a PBMP implementation strategy include RSA, ROFA, TOFA/TSA, Apron, and AOA
- Establish the DOTA defined FAA Exemption Zones for PBMP installation maps

FAA Exemption Zone for PBMP Installation Daniel K. Inouye International Airport (HNL)

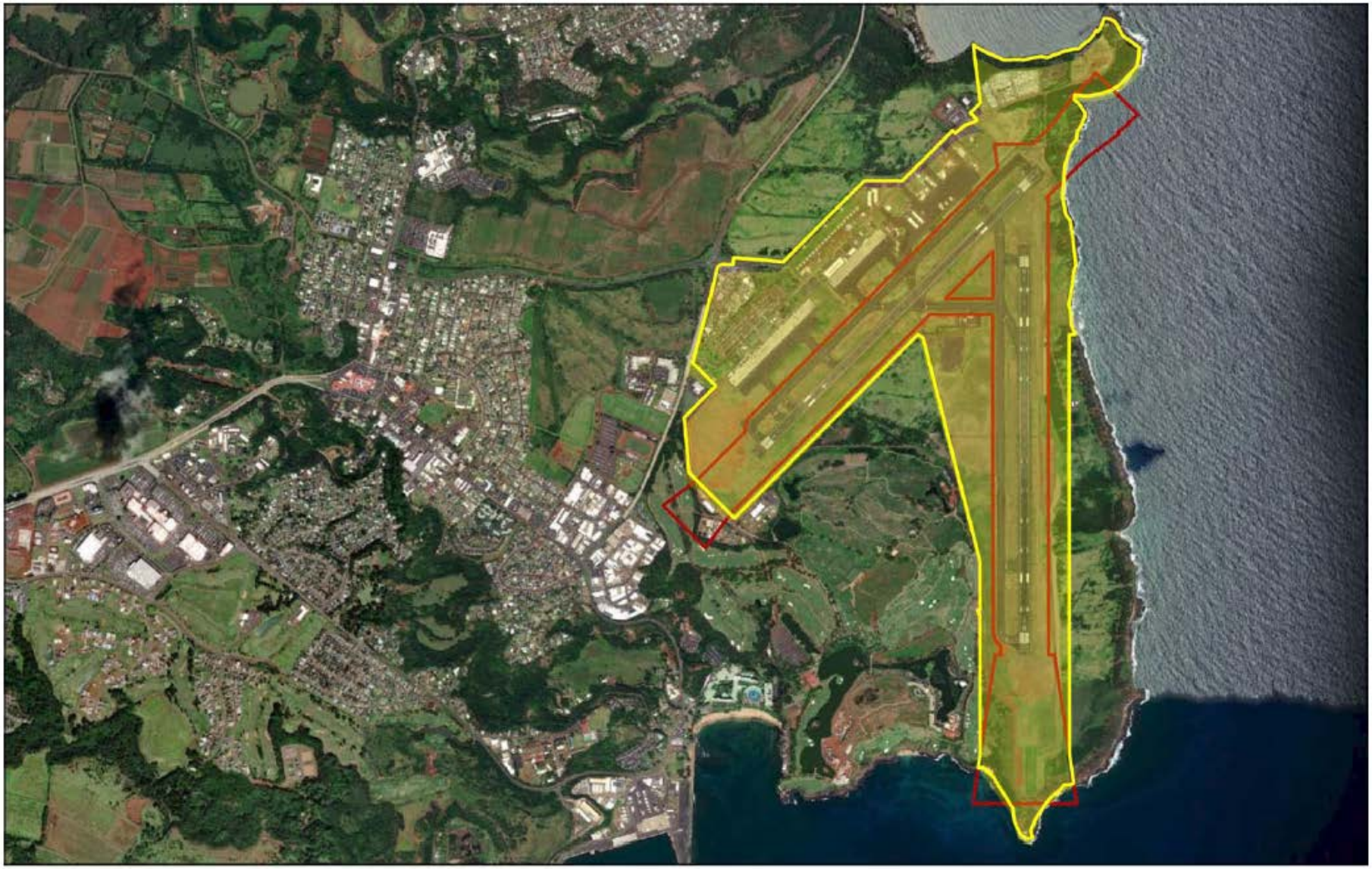
Legend

FAA PBMP Exemption Zone

Airport Property Line

0 0.1 0.2 0.4 0.6 0.8 Miles

N



FAA Exemption Zone for PBMP Installation Lihue Airport (LIH)

FAA Exemption Zone for PBMP Installation Kahului Airport (OGG)

Legend

- FAA PBMP Exemption Zone
- Airport Property Line

PBMP Variance

- Utilizes a documented process using the AMS to grant a variance from PBMP implementation
  - Project is located within the FAA Exemption Zone for PBMP installation (refer to Appendix I or the AMS)
  - Project returns the area to pre-development runoff conditions
  - Project is solely to address Water Quality Improvement or Preservation (examples include Shoreline Protection, Landscaping, PBMP Installation / Retrofit, and Permanent Erosion Control)
  - Other*

PBMP Variance (Designer)

Date/Time

Set Date/Time...

PBMP Items

Is the project located within the FAA Exemption Zone for PBMP Installation?

See map link below.

- Yes
- No

Map Link

Project will return the area to pre-development runoff conditions

- Yes
- No

Project is solely a water quality improvement or preservation project (e.g., shoreline protection, landscaping, PBMP installation / retrofit, or erosion and water pollution control)

- Yes
- No

Other Variance (provide explanation for proposed

Cancel

Post-Construction BMP Manual Updates – LID PBMP Infeasibility & Waiver

LID PBMP Infeasibility and Waiver

- Establishes a clear and consistent approach for LID PBMP implementation
  - Streamline infiltration feasibility including physical restrictions, infiltration feasibility, depth to ground water etc.
  - Waivers from LID PBMP implementation
- Utilizes a documented process using the AMS to grant a waiver from LID PBMP implementation

LID PBMP Infeasibility Criteria

- Infiltration Requirements
  - Determination of infiltration rates
- LID PBMP Infeasibility Criteria
  - Infiltration infeasibility
  - Biofiltration infeasibility
  - Harvesting/reuse infeasibility
  - Other Infeasibility
  - Refer to section 3.4 and Appendix III or the AMS

Design Review -

LID Feasibility & Waiver Screening (Designer)

The following is Feasibility Screening for various LID PBMPs and will provide a list of evaluation criteria which will provide a waiver from LID based on the following:

- ***Infiltration Infeasibility***
- ***Biofiltration PBMP Feasibility***
- ***Collection / Reuse Feasibility***
- ***Others (at the discretion of DOTA Environmental Section)***

LID Waiver Feasibility Screening

Infiltration Feasibility Evaluation Criteria

Based on the answers to the questions below, infiltration is feasible or infeasible

Question 1

Do soils beneath the PBMP invert have measured boring and infiltration rates less than 0.5 in/hr?

- ◯ Yes
- ◯ No

Documentation

Drop files or click to add

Question 2

Are soils beneath the PBMP invert classified as HSG "C" or

Cancel

Post-Construction BMP Manual Updates – PBMP Implementation

PBMP Categories and Preference

LID

- Retain stormwater on-site

Source Control

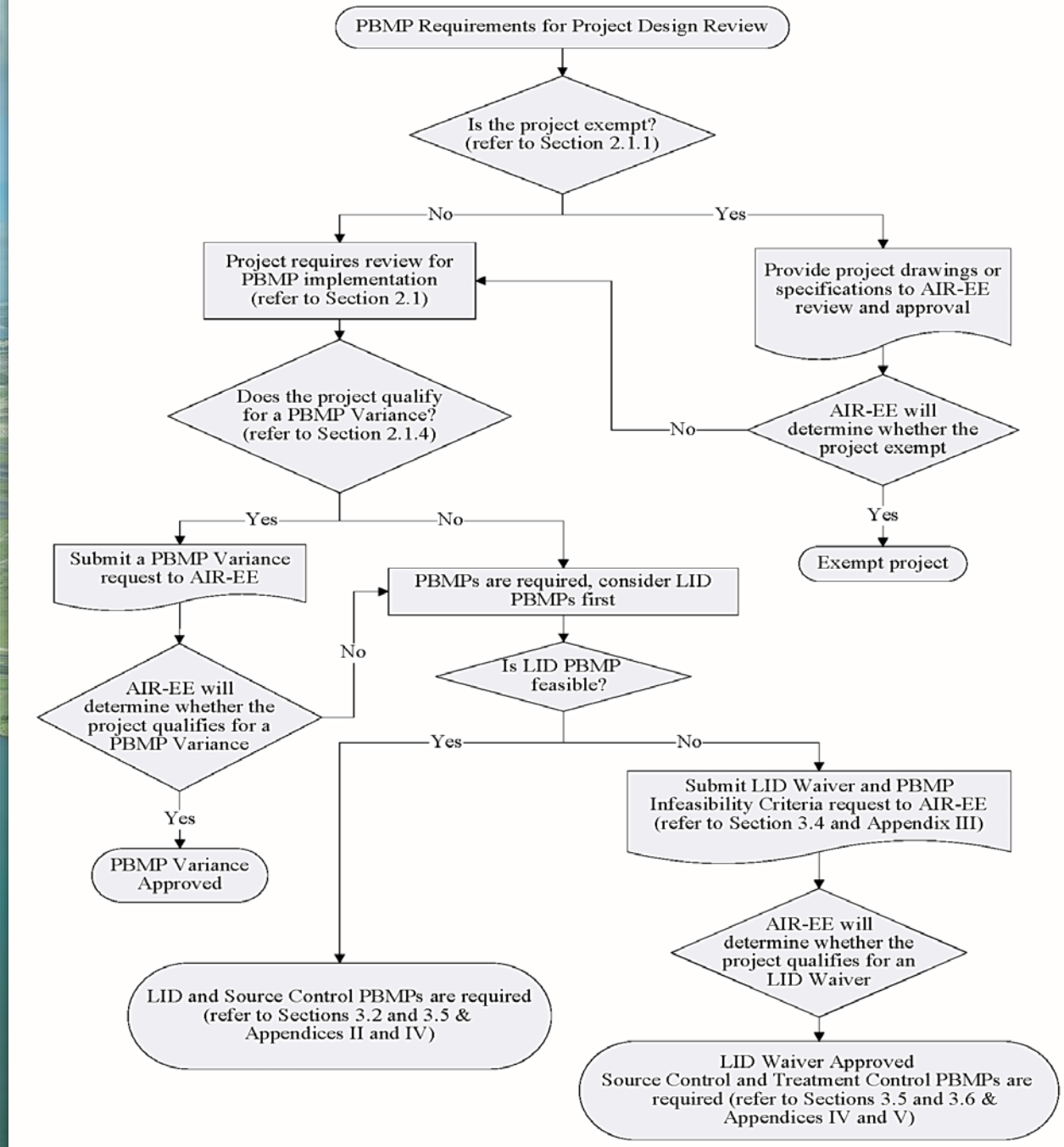
- Keep potential pollutants from coming into contact with stormwater runoff or before they are discharged to DOTA MS4, drainage system, or State waters

Treatment Control

- Remove pollutants from the stormwater runoff before they are discharged to DOTA MS4, drainage system, or State waters

PBMP Implementation Requirements

PBMP Category	Applicable Projects
LID	Required for all non-exempt projects that do not qualify for a PBMP variance
Source Control	Required for all non-exempt projects
Treatment Control	Required for all non-exempt projects that do not qualify for a PBMP variance **if LID is infeasible**


PBMP Requirements for Project Design Review
Is the project exempt? (refer to Section 2.1.1)
No
Yes
Project requires review for PBMP implementation (refer to Section 2.1)
Provide project drawings or specifications to AIR-EE review and approval
Does the project qualify for a PBMP Variance? (refer to Section 2.1.4)
No
AIR-EE will determine whether the project exempt
Yes
Yes
No
Exempt project
Submit a PBMP Variance request to AIR-EE
PBMPs are required, consider LID PBMPs first
No
AIR-EE will determine whether the project qualifies for a PBMP Variance
Is LID PBMP feasible?
Yes
Yes
No
PBMP Variance Approved
Submit LID Waiver and PBMP Infeasibility Criteria request to AIR-EE (refer to Section 3.4 and Appendix III)
AIR-EE will determine whether the project qualifies for an LID Waiver
LID and Source Control PBMPs are required (refer to Sections 3.2 and 3.5 & Appendices II and IV)
LID Waiver Approved
Source Control and Treatment Control PBMPs are required (refer to Sections 3.5 and 3.6 & Appendices IV and V)

Standardized LID PBMPs

LID PBMP Name	PBMP Design Fact Sheet	LID PBMP Type
Biofilter	LC-1	Biofiltration
Bioretention	LC-2	Retention
Bioswale	LC-3	Biofiltration
Harvesting/Reuse	LC-4	Retention
Dry Well/ Drainage Well	LC-5	Retention
Infiltration Basin	LC-6	Retention
Infiltration Trench	LC-7	Retention
Permeable Pavement	LC-8	Retention
Subsurface Infiltration	LC-9	Retention
Vegetated Buffer Strip	LC-10	Biofiltration
Vegetated Swale	LC-11	Biofiltration

Standardized LID PBMPs

LID PBMP Design Fact Sheets

LC-3: Bioswale

PBMP Category

☒LID
☐Source Control
☐Treatment Control

Pollutants Targeted

☒Bacteria
☒Metals
☒Nutrients
☒Oil & Grease
☒Organic Compounds
☐Pathogens
☐Pesticides
☒Sediment
☒Trash
☐Other:

Bioswale at Terminal 3 Parking Lot, Daniel K. Inouye International Airport

DESCRIPTION

A bioswale, sometimes referred to as a bioretention swale or an enhanced swale, is a shallow linear channel with a media layer covered with turf or other surface material (other than mulch or plants). Runoff is captured in the cells formed by check dams, filters through a media layer, and discharges at the downstream end of the swale; the filtered runoff can also collect and return to the DOTA MS4 or drainage system via underdrains.

LIMITATIONS

A bioswale is considered infeasible if any of the following conditions are met.

- **A site where biofiltration is determined to be infeasible (refer to the Biofiltration Infeasibility Evaluation Criteria within the LID Waiver and PBMP Infeasibility Screening Criteria (section 3.4)).**
- **Unstable surrounding soil stratum and soils with clay content greater than 25%.**

AREA REQUIREMENTS

- A bioswale requires a footprint equivalent to 8% - 40% of its contributing impervious drainage area. The lower value reflects the maximum allowable values for the specified dependent variables, while the upper value reflects the minimum allowable values for all specified parameters.

MINIMUM DESIGN CRITERIA

Design Parameter	Units	Value
Maximum Interior Side Slope (length per unit height)	ft/ft	3:1
Bottom Width	ft	2 - 8
Maximum Longitudinal Slope without Check Dams	%	2
Maximum Longitudinal Slope with Check Dams	%	5
Maximum Check Dam Height	in	12
Maximum Ponding Depth at downstream end	in	18
Media Layer Depth	in	18 - 36
Minimum Freeboard	ft	0.50
Minimum Underdrain Diameter	in	6

SIZING GUIDELINES

Step 1: Use the procedure below to compute the volumetric runoff coefficient and WQV.

The volumetric runoff coefficient should be calculated using the following equation:

$$C = 0.05 + 0.009I$$

where C = Volumetric Runoff Coefficient
I = Impervious Cover (%)

The WQV is calculated using the following equation:

$$WQV = PCA \times 3630$$

where WQV = Water Quality Design Volume (ft^3)
P = Design Storm Runoff Depth (in) (refer to section 4.3.1)
C = Volumetric Runoff Coefficient
A = Tributary Drainage Area (ac)

Step 2: Select values for the media layer depth (l_m), drainage layer depth (l_d), media layer porosity (n_m), drainage layer porosity (n_d), maximum surface ponding depth (d_s, if check dams are used), bottom width (w_b), and interior side slope (z, length per unit height).

Standardized Source Control PBMPs

Source Control PBMP Name	PBMP Design Fact Sheet
Dispersion	SC-1
Fueling Area Design	SC-2
Loading Area Design	SC-3
Maintenance Area Design	SC-4
Material Storage Area Design	SC-5
Triturator Facility Design	SC-6
Washing Area Design	SC-7
Waste Management Area Design	SC-8

Standardized Source Control PBMPs

Source Control PBMP Design Fact Sheets

SC7: Washing Area Design

PBMP Category

☐ LID
☒ Source Control
☐ Treatment Control

Pollutants Targeted

☐ Bacteria
☒ Metals
☒ Nutrients
☒ Oil & Grease
☒ Organic Compounds
☐ Pathogens
☐ Pesticides
☒ Sediment
☐ Trash
☒ Other: Surfactants, paints, etc.

East Wash Rack, Daniel K. Inouye International Airport

DESCRIPTION

Aircraft, vehicle, and equipment washing may result in various pollutants associated with washing activities such as surfactants, sediment, and petroleum products. This PBMP includes design recommendations to mitigate those potential impacts.

APPROACH

Project plans should include appropriately designed area(s) for washing aircraft, vehicles, and equipment. Depending on the size and other parameters of the facility, wash water may be conveyed to a sewer, an infiltration system, a recycling system, or another alternative. Pretreatment may be required for a discharge to a sanitary sewer.

SUITABLE APPLICATIONS

Applications include areas planned for development and redevelopment.

LIMITATIONS

Implementation of covers may be limited by the size of aircraft, vehicle, or equipment that requires washing.

DESIGN CONSIDERATIONS

Design requirements for the washing areas are governed by applicable standards and specifications of federal, state, and county agencies with jurisdiction. The design requirements may pertain to DOT, airport, FAA, Building Code, Fire Code, county agency ordinances, and county zoning requirements. Design requirements described in this fact sheet are meant to enhance and be consistent with these standards, specifications, code, and ordinance requirements.

GENERAL

- Design the washing area to be contained and to prevent dragout of wash water. The design should include grading the site to a central drain, placing berms around the perimeter, locating it indoors or under cover (if feasible), or some other containment method.
- Discharge wash water to the sanitary sewer, a holding tank, process treatment system, or an enclosed recycling system.
  - Include a wash water treatment device or pretreatment device such as an OWS.
  - Consider recycling the water after filtration or direct excess to the sanitary sewer, where county ordinances allow.
  - Install sumps or drain lines to collect wash water. Divert wash water to the sanitary sewer or an equally effective alternative.
  - Slope the washing area towards a dead-end sump to contain spills.
  - Provide containment areas and sumps with impervious surfaces for accumulation of stormwater and non-stormwater since accumulated water can be contaminated. Contaminated stormwater, should be disposed of following applicable laws and cannot be discharged directly to the DOTA MS4, drainage system, or State waters.
- Provide identification for the wash area and signage about approved washing practices.

DRAINS

- Prevent stormwater runoff from flowing through the washing area.
- Route downspouts and storm drains such that runoff will not flow through the washing area.
- Direct and divert stormwater runoff away from the washing area and the exposed area around the washing area to alternatives other than the sanitary sewer.

DESIGNING NEW INSTALLATIONS

- Implement the applicable PBMPs from the "Design Considerations, General" section of this Fact Sheet.
- The washing area should be self-contained and include a roof or an overhang.
- Pretreatment may be required.
- The washing area should have a proper connection to a sanitary sewer, where county regulations allow.

Standardized Treatment Control PBMPs

Treatment Control PBMP Name	PBMP Design Fact Sheet
Alternative Wetland	TC-1
Dry Detention Basin	TC-2
Evaporation Pond	TC-3
Hydrodynamic Separator or HDS Unit	TC-4
Manufactured Treatment Device or MTD	TC-5
Oil Water Separator or OWS	TC-6
Sand Filter	TC-7
Subsurface Detention	TC-8

Standardized Treatment Control PBMPs

Treatment Control PBMP Design Fact Sheets

TC-4: Hydrodynamic Separator Unit

PBMP Category

☐LID
☐Source Control
☒Treatment Control

Pollutants Targeted*

☐Bacteria
☒Metals
☒Nutrients
☒Oil & Grease
☒Organic Compounds
☒Pathogens
☒Pesticides
☒Sediment
☒Trash
☒Other: Varies

*Pollutant removal may vary based on type of HDS Unit.

Continuous Deflective Separator Unit
Daniel K. Inouye International Airport

DESCRIPTION

A hydrodynamic separator or HDS unit is also known as a vortex separator, a swirl separator, a swirl concentrator, or a continuous deflective separator unit. Vortex separators are gravity separators and essentially wet vaults. Vortex separators, swirl separators, or swirl concentrators are flow-through structures that use a vortex action to separate coarse sediment and floatables (trash, debris, etc.) from stormwater.

HDS units are flow-through structures with a settling or separation unit to remove sediments and other pollutants. No outside power source is required because the energy of the flowing water allows the sediments to separate efficiently. Depending on the type of unit, this separation may be achieved using swirl action or indirect filtration.

The continuous deflective hydrodynamic separators use swirl concentration and continuous deflective separation to screen, separate and trap trash, debris, sediment, and hydrocarbons from stormwater runoff. The continuous deflective separator technologies direct solid pollutants into the lower catchment chamber and the floatables to the surface of the upper chamber using a non-mechanical, non-blocking screen technology.

Manufacturers have developed several proprietary versions of HDS units for stormwater treatment. These HDS units function differently, include various components, and provide water quality by removing coarse sediment and floatables; some models may also remove oil and grease. The pollutant removal performance may vary depending on the type and model of the proprietary HDS unit selected for the project. Therefore, project proponents need to review the manufacturer's specifications to determine pollutants targeted for removal.

LIMITATIONS

- Some HDS units have standing water that remains between storms which could be a mosquito breeding concern.
- The drainage area served is limited by the capacity of the largest models available.
- HDS units are not effective for the removal of dissolved pollutants, fine sediments, and pollutants that adhere to fine sediments.
- HDS units are considered infeasible for any of the following conditions:
  - The bottom of the PBMP is below the seasonally high groundwater table.
  - Unable to operate off-line and unable to operate in line with a safe overflow mechanism.

DESIGN GUIDELINES

General

- All HDS units should safely overflow, or bypass flows in excess of the stormwater quality design storm to downstream drainage systems.
- Consider using HDS unit models certified for general use by the Washington State Department of Ecology TAPE or certified by the NJDEP.
- Follow the manufacturer's guidelines for design considerations based on the site conditions.
- There are no specific landscaping requirements. However, areas around these units should be clear at the surface and accessible for maintenance and inspection purposes.
- Aggressive maintenance plans are required to reduce the risk of re-suspension of sediment during large storm events.
- Manholes should be included in each chamber for cleaning access.
- OWSs may be used in conjunction with these units to remove oils.

Pretreatment Considerations

- No pretreatment is required. Project proponents may consider a treatment train in conjunction with OWS or manufactured treatment devices if targeting various pollutants.

Post-Construction BMP Manual Updates – PBMP Design Criteria

PBMP Design Criteria

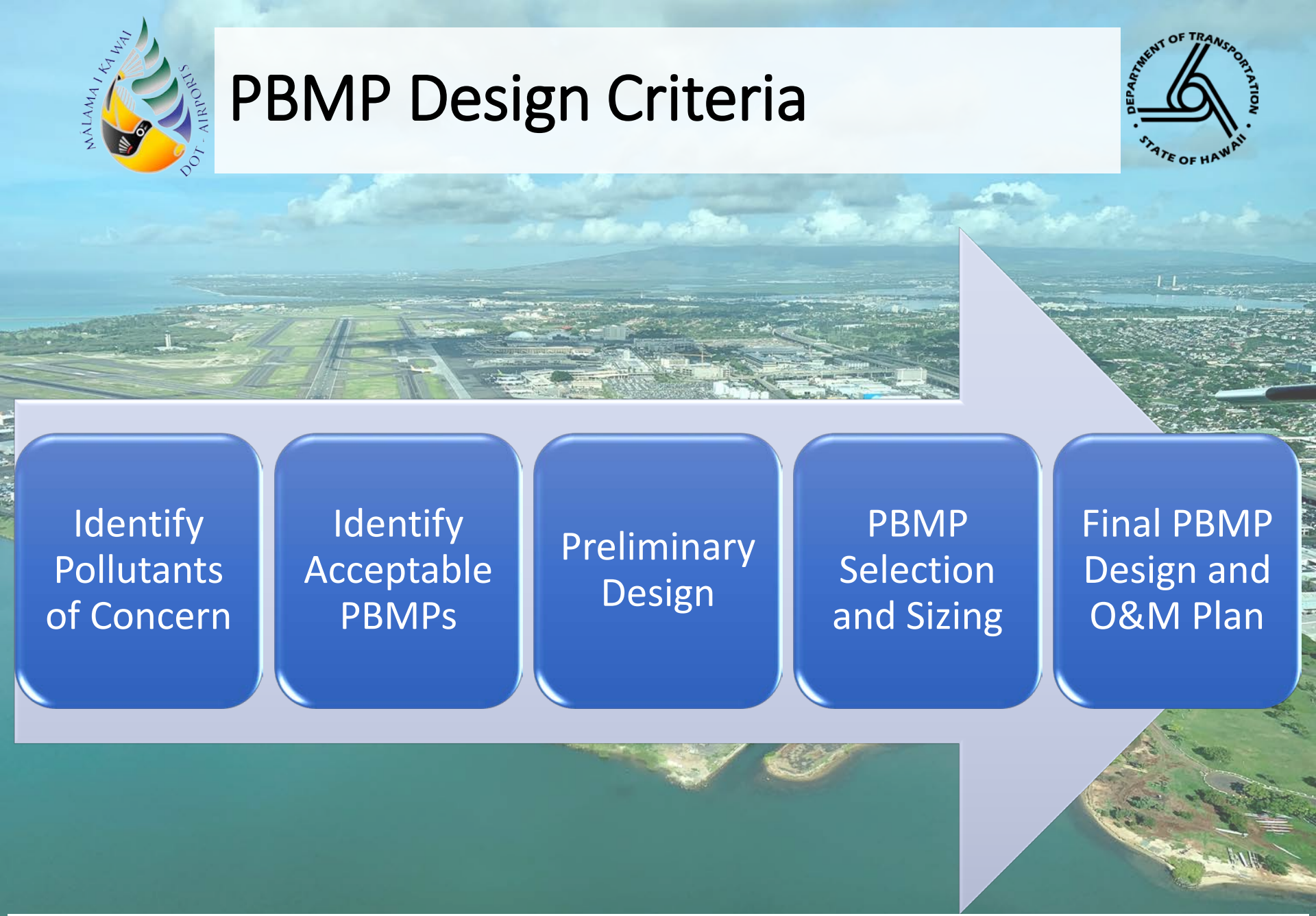


Figure 4-1 from the PBMP Manual

PBMP Design Criteria

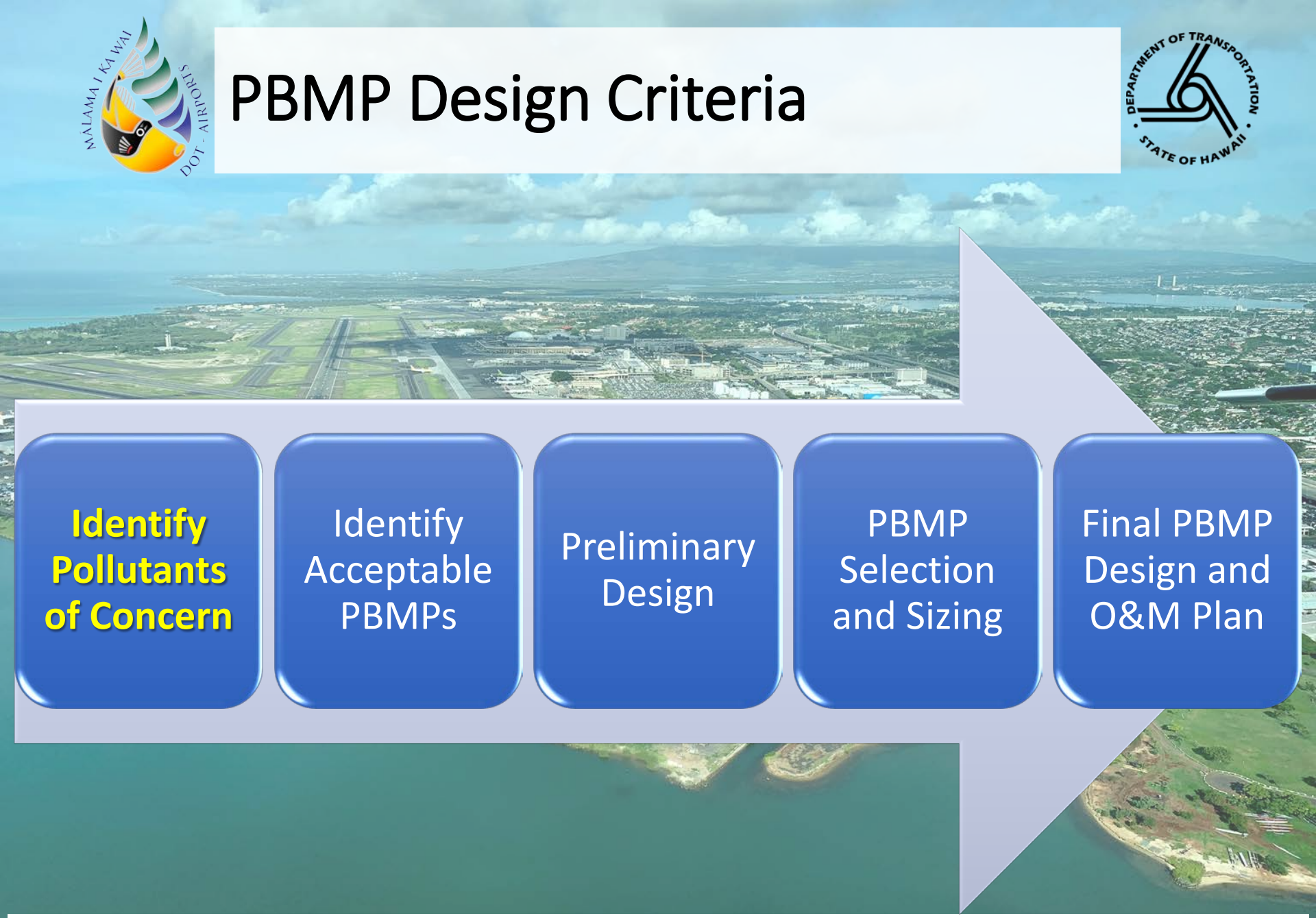


Figure 4-1 from the PBMP Manual

How to Identify Pollutants of Concern

- Project proponents should identify anticipated pollutants of concern based on:
  - Planned Activities
  - Planned Site Design
  - Land use type of the project and associated potential pollutants
  - Legacy pollutants that may potentially be present on the site
  - Changes in stormwater discharge flow rates, velocities, durations, and volumes
  - Sensitivity of receiving waters to changes in stormwater discharge flow rates, velocities, durations, and volume
  - Receiving water quality [303(d) List of Impairments]

PBMP Requirement, Performance, Selection, and Design Questions

The following are a list of questions that need to be answered when a project is required to implement PBMPs including LID.

Nearest Water Body

Does the project discharge to a water body?

Yes

Identify the nearest and first receiving water body that has the potential to receive a discharge from the project site and consider all applicable pollutants of concern for those receiving water bodies at the link below:
Table Depicting Minimum Pollutants of Concern based on Receiving Waters

What is the nearest receiving water body?

Enter Text...

What pollutants of concern have been identified for your receiving water?

- [ ] Bacteria (Enterococci)
- [ ] Chlorophyll a
- [ ] Nutrient - NH4
- [ ] Nutrient - NO3+NO2
- [ ] Nutrient - PO4
- [ ] Nutrient - TN
- [ ] Nutrient - TP
- [ ] Sediment - TSS
- [ ] Sediment - Turbidity
- [ ] Trash

Have the minimum pollutants of concern been considered based on the receiving water? REQUIRED

- ( ) Yes
- ( ) No

Site Activities and Land Use

What pollutants of concern are associated with your final site activities or land use after project completion?

Note: This may include oil and grease, particulates, etc. that are associated with your site activities after construction commences. Please reference the DOTA PBMP manual for more information.

- [ ] Bacteria (Enterococci)

PBMP Design Criteria

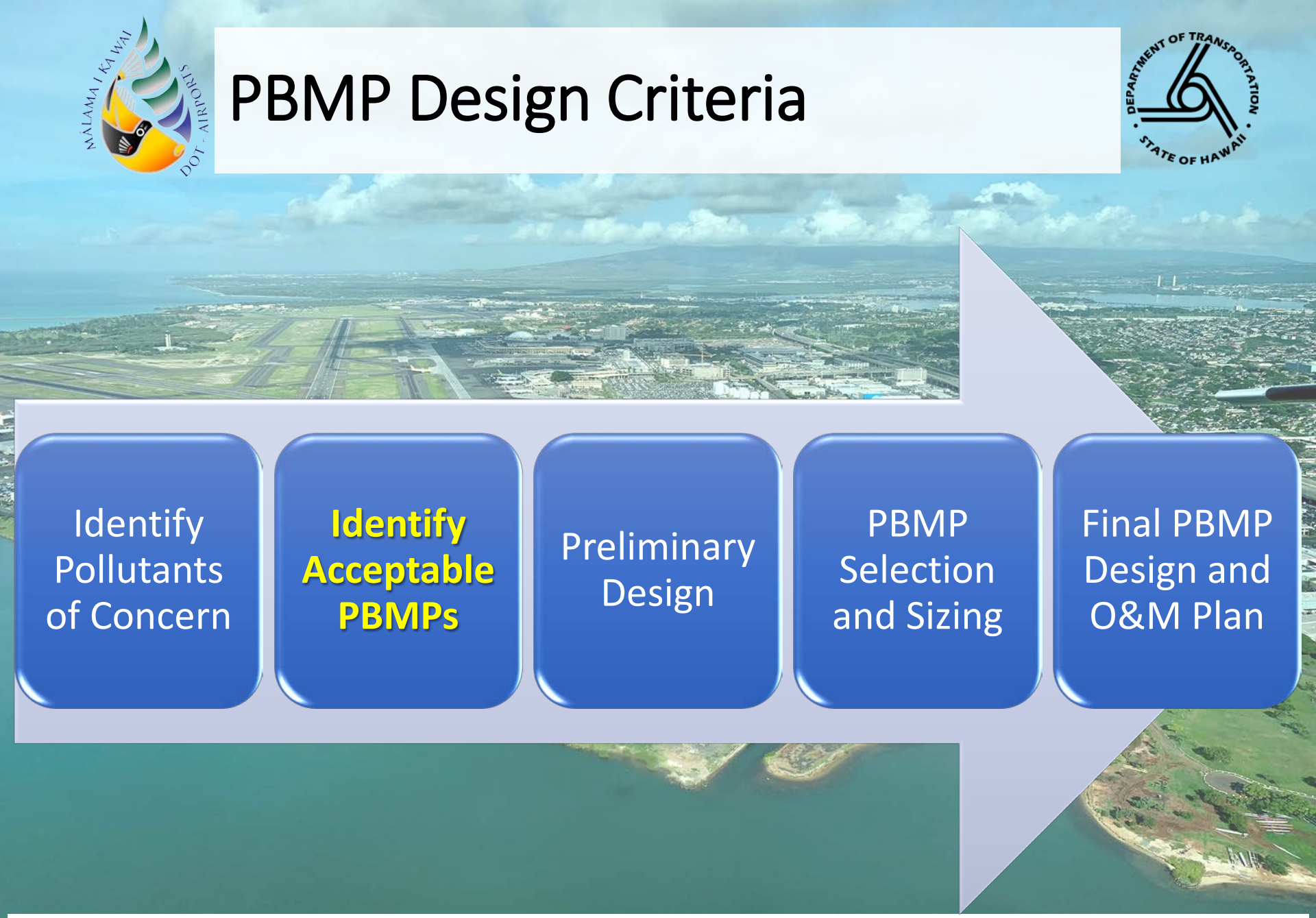


Figure 4-1 from the PBMP Manual

Table 4-1. LID and Treatment Control PBMP Pollutant Removals

PBMP # and Name	Bacteria	Metals	Nutrients	Oil & Grease	Organic Compounds	Pathogens	Pesticides	Sediment	Trash
LC-1 Biofilter*	L	H	M	H	H	M	U	M/H	H
LC-2 Bioretention	L	H	H	H	H	H	H	H	H
LC-3 Bioswale	L	M	M	M	L/M	U	U	H	H
LC-4 Collection and Reuse	U	H	H	H	H	H	H	H	L
LC-5 Dry Well/Drainage Well	U	H	H	H	H	H	H	H	H
LC-6 Infiltration Basin	U	H	H	H	H	H	H	H	H
LC-7 Infiltration Trench	U	H	H	H	H	H	H	H	H
LC-8 Permeable Pavement	U	H	H	H	H	H	H	H	H
LC-9 Subsurface Infiltration	U	H	H	H	H	H	H	H	H
LC-10 Vegetated Buffer Strip	L	M	L	M	M	L	U	M	M
LC-11 Vegetated Swale	L	M	L	M	L	L	U	M	L
TC-1 Alternative Wetland*	L/M	H	L	U	U	L	U	H	H
TC-2 Dry Detention Basin	U	L/M	L	M	U	L	U	M	H
TC-3 Evaporation Pond	U	L	L	M	U	L	U	M	H
TC-4 Hydrodynamic Separator (HDS)*	U	L	L	M/H	L	L	L	M/H	H
TC-5 Manufactured Treatment Device*	L	L	L	M/H	L	L	L	M/H	H
TC-6 Oil Water Separator*	U	L	L	H	L	L	L	M/H	H
TC-7 Sand Filter	M/H	M/H	L/M	H	M/H	M	U	H	H
TC-8 Subsurface Detention*	U	L/M	L	M	U	L	U	M	H

Notes:

H = High

L = Low

M - Medium

U = Unknown

* The pollutant removal performance may vary depending on the type and model of the product selected.

Sources:

Storm Water BMP Guide for New and Redevelopment (CCH, July 2017).

Preliminary Data Summary of Urban Storm Water Best Management Practices, EPA-821-R-99-012 (EPA, August 1999).

Minnesota Stormwater Manual (Minnesota Pollution Control Agency, February 17, 2021).

PBMP Design Criteria

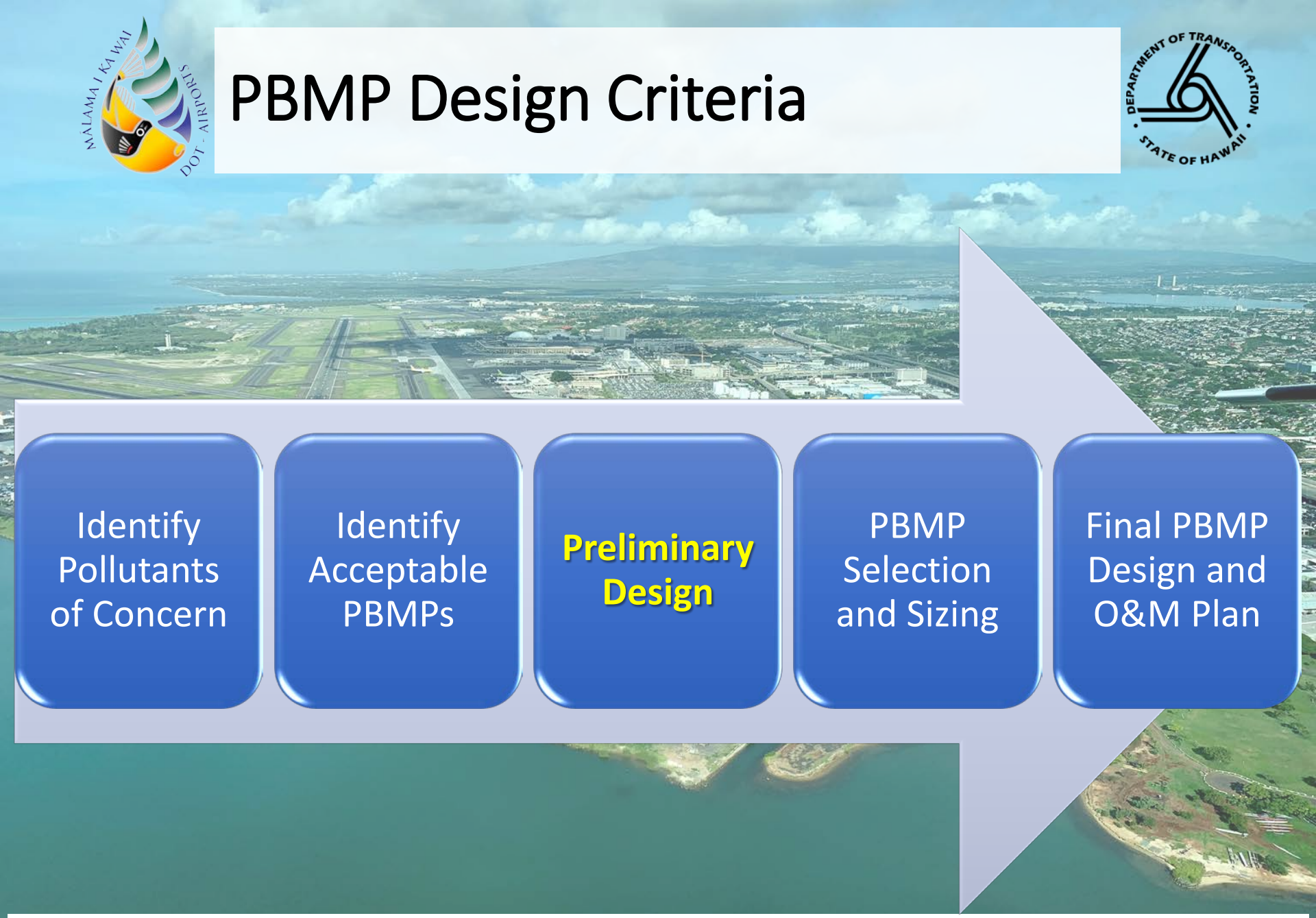
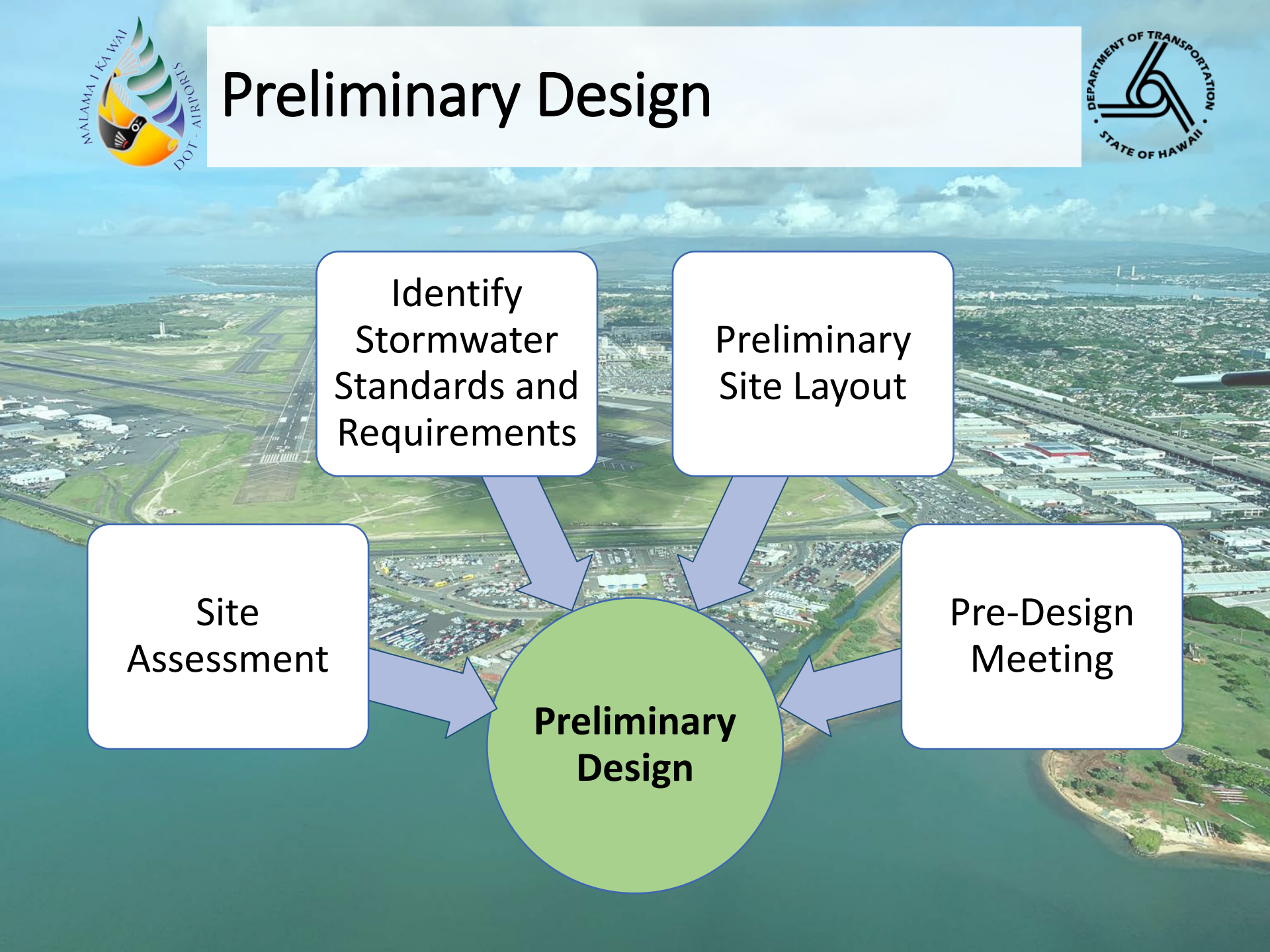


Figure 4-1 from the PBMP Manual

Preliminary Design



PBMP Design Criteria

Figure 4-1 from the PBMP Manual

PBMP Selection and Sizing Criteria

- DOTA requires specific criteria for PBMPs for both volume-based and flow-based BMP designs
  - Volume-Based Design (capture 1-inch rainfall)
  - Flow-Based Design (0.4 inch/hour)
- Sizing calculations for individual PBMPs are provided in the PBMP Design Fact Sheets
- PBMP selection can be based on space available and the site/project constraints

PBMP Design Criteria

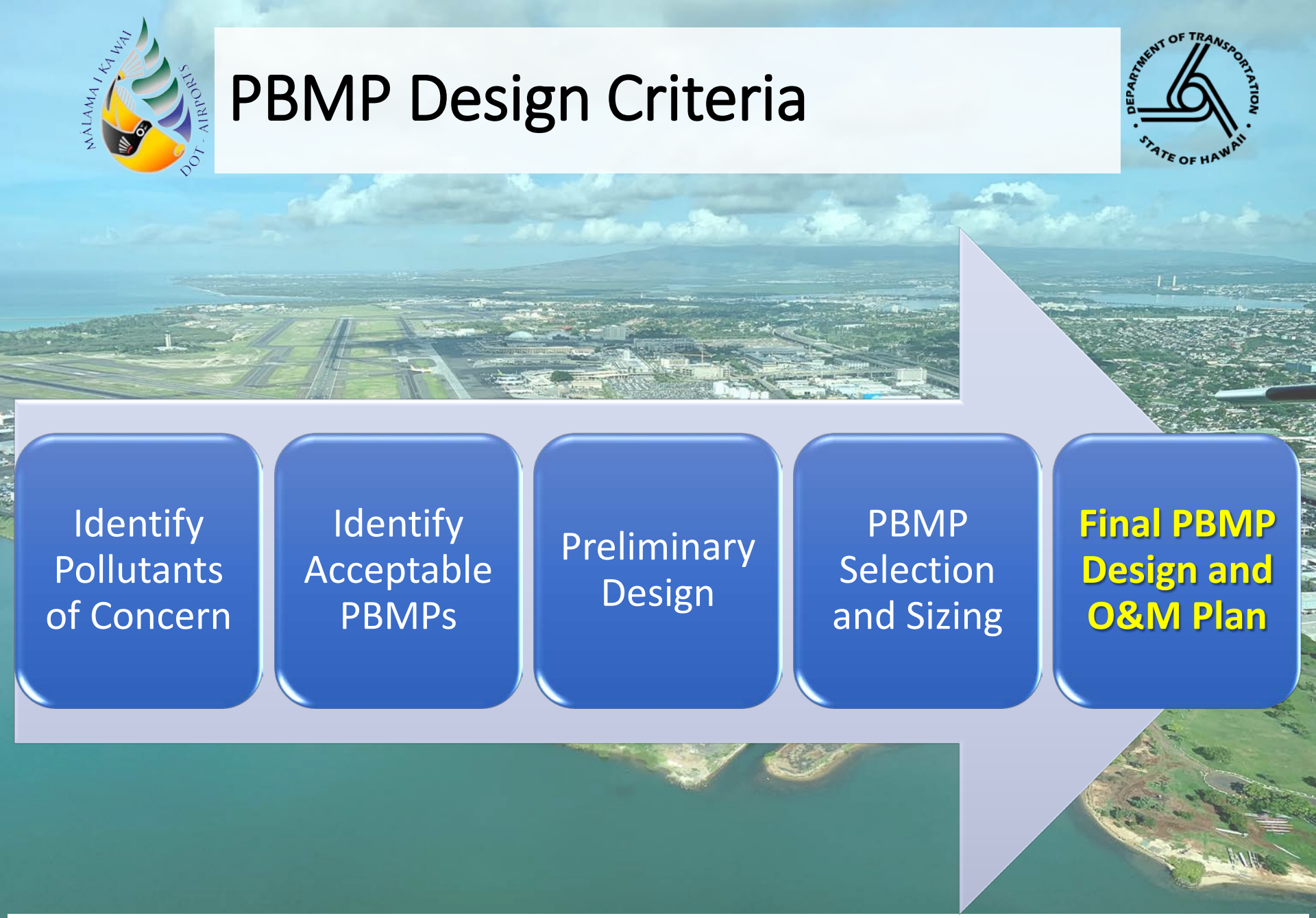


Figure 4-1 from the PBMP Manual

Final PBMP Design

- Design Phase - using the AMS
  - Submit the project review package
  - Address comments from AIR-EE
  - Finalize drawings, specifications, PBMP sizing calculations, PBMP O&M Plan, and PBMP O&M costs
- Construction Phase - using the AMS
  - Submit shop drawings and any PBMP design changes to AIR-EE
  - Address comments from AIR-EE
  - Finalize drawings, specifications, PBMP sizing calculations, PBMP O&M Plan, and PBMP O&M costs
  - Provide GPS coordinates, O&M end date, warranty information, and PBMP turnover date

PBMP O&M Plan

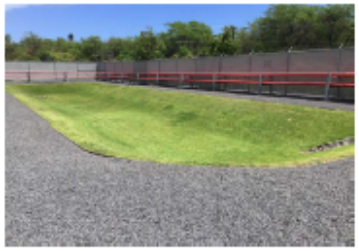
- Project documents shall include PBMP O&M Plan
- Developed PBMP O&M Fact Sheets
  - Inspection and maintenance considerations
  - Can be used as PBMP O&M Plan for project submission
- AMS (Veoci) modules for PBMP design review as well as PBMP inventory, inspection, and maintenance tracking are under final development

O&M Fact Sheets

PBMP O&M Fact Sheet

LC-6: Infiltration Basin

An infiltration basin is a shallow impoundment with no outlet, where stormwater runoff is stored and infiltrates through the basin invert and into the soil matrix. Maintenance is primarily focused on preventing sediment build-up and clogging, which reduces the capacity of the system.



Infiltration Basin, Kahului Airport

INSPECTION PROCEDURES

- Inspect surface drainage systems and flow entrances for accumulation of sediment, trash, debris, litter, and leaves.
- Inspect pretreatment measures for sediment, trash, and debris accumulation.
- Monitor observation wells, if present, to determine how quickly the system is draining after a storm.
- Inspect the infiltration basin for ponded water (i.e., standing water in the infiltration basin that does not drain after 48 hrs of the storm event).
- Inspect surfaces and embankments for damage caused by erosion, rodents, vehicles, or other reasons. Walk around the infiltration basin and note the locations of erosion or drainage changes.
- Note landscaping changes that need to be addressed (e.g., grass cutting).
- Observe discharge, if present, and the origin of discharge if it can be viewed. Note if alternate drainage patterns have developed.
- Use AMS for PBMP inspection and tracking.

CONDITIONS THAT WARRANT MAINTENANCE

- Accumulation of sediment, trash, debris, litter, and leaves.
- Significantly overgrown areas that require landscape maintenance; grass should be maintained at least 3 in of height.
- Vegetation is dead or diseased; note that vegetation can be dormant during dry seasons.
- The area exhibits significant erosion or changes to the drainage pattern (water drains away from PBMP or is bypassed).
- Water ponding in an infiltration basin for longer than 48 hrs suggests the presence of sediment or trash blockages, reduction of soil infiltration rate due to compaction, or clogging of media layer or the underdrain/permeable filter fabric.
- Recent oil spill or fuel spill.
- Output flow is significantly dirty or contains significant odors.

PBMP O&M Fact Sheet

TC-3: Evaporation Pond

Evaporation ponds are shallow man-made ponds with large surface areas designed to hold a set volume of stormwater runoff and allow for evaporation by sunlight and exposure to the ambient temperatures, wind, and humidity with no outlet structure. Maintenance is primarily focused on sediment removal and mosquito abatement.

Evaporation Pond at Kahului Airport

INSPECTION PROCEDURES

- Inspect surface drainage systems and flow entrances for accumulation of sediment, trash, debris, and litter.
- Inspect pretreatment measures for sediment, trash, and debris accumulation.
- Inspect the embankment, dikes, berms, and side slopes for structural integrity and signs of erosion or rodent burrows.
- Inspect inlets, piping, and overflow structures/emergency spillways for clogging and signs of erosion.
- Walk around the entire perimeter of the pond.
- Inspect for structural damage of structures.
- Inspect the evaporation pond for ponded water, i.e., standing water in the pond for longer than the design drawdown time, 48hrs.
- Monitor how quickly the pond is evaporating after a storm.
- Inspect for wildlife issues and evidence of mosquitoes or mosquito larvae.
- Use AMS for PBMP inspection and tracking.

CONDITIONS THAT WARRANT MAINTENANCE

- Accumulation of sediment, trash, debris, and litter.
- Water ponding in an evaporation pond suggests that sediment or trash blockages may be present or the bottom of the basin needs regrading.
- Observed evidence of mosquitoes or mosquito larvae.
- Recent oil spill or fuel spill.
- Output flow is significantly dirty or contains significant odors.
- Structural damage.

Veoci

PBMP Inspection and Maintenance - #500275157

Background Data

Visual Inspection

General BMPs

Maintenance Item	Options REQUIRED	Comments / Actions Required	Comments / Actions Required REQUIRED
1. Structural Appearance	○ Satisfactory ● Unsatisfactory ○ N/A Reset	Enter Text...	Splash Block cracked down center. Will notify baseyard to see if they can repair the crack with concrete.
2. Unauthorized Modification	● Satisfactory ○ Unsatisfactory ○ N/A Reset	No response needed	
3. Trash and Debris	○ Satisfactory ● Unsatisfactory ○ N/A Reset	Enter Text...	Trash observed at base of splashblock. Trash was removed during this inspection.

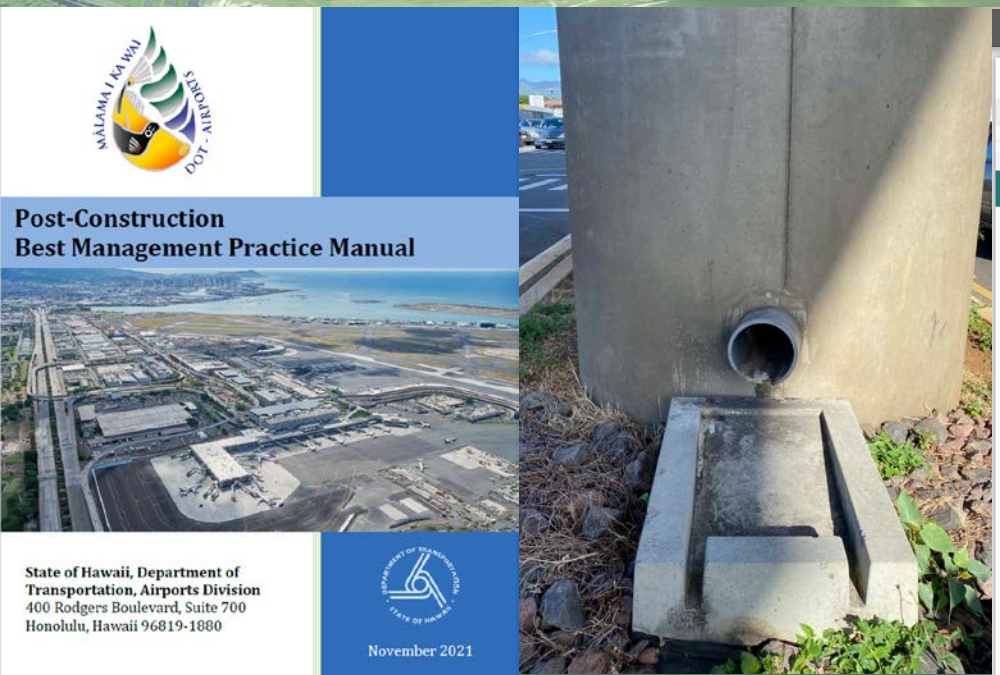
Post-Construction BMP Manual Updates – Implementation

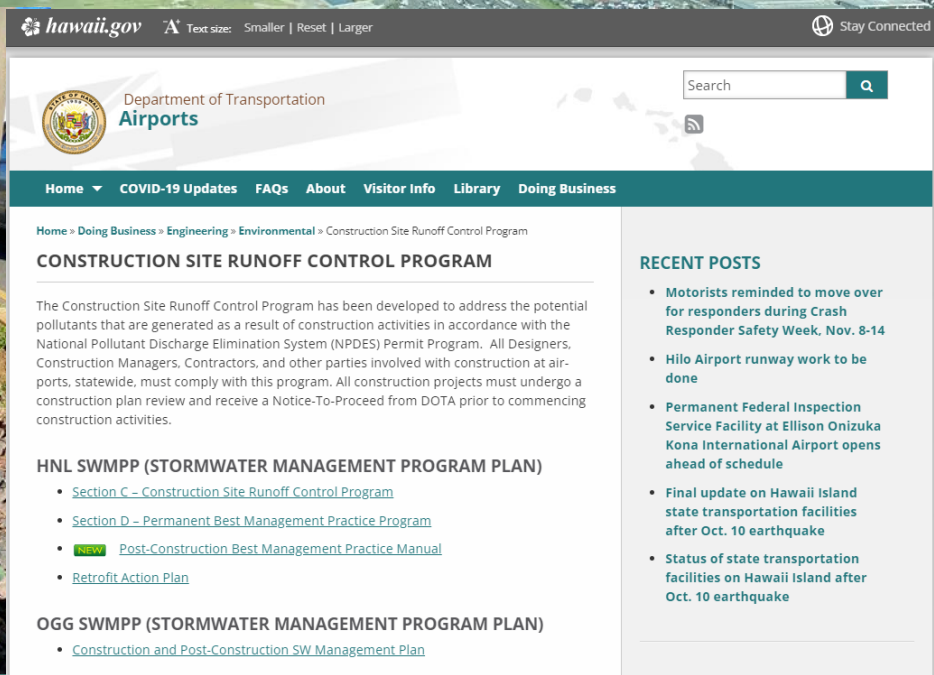
Implementation Schedule

- Post-Construction BMP Manual – Completed
- HNL SWMPP Revisions – December, 2021
- Veoci Implementation
  - Construction Design Review – Under final development

Resources

- Post-Construction Best Management Practices Manual
- https://hidot.hawaii.gov/airports/doing-business/engineering/environmental/construction-site-runoff-control-program/
- DOTA AMS, Veoci






Questions?