

Post-Construction Controls: Lessons from the Field

Guam Stormwater Workshop
July 29, 2011



Overview

“If it’s a job worth doing, its worth doing right”

Session Objectives

Overview of the Post-Construction Controls Development Process

- Site planning
- BMP selection
- BMP construction oversight
- BMP ownership and tracking
- Long-term maintenance

Responsibility at Various Levels

Public Entity/Control

Authority

- Develop the standards and guidance
- Ensure BMPs meet site suitability, water quality, and hydrology objectives
- Issue permits and conduct oversight during construction
- Ensure maintenance and long-term performance

Private Developer/Owner

- Understand standards and guidance
- Incorporate post-construction BMPs into site plans
- Install post-construction BMPs according to site plans
- Ensure maintenance or transfer maintenance obligations



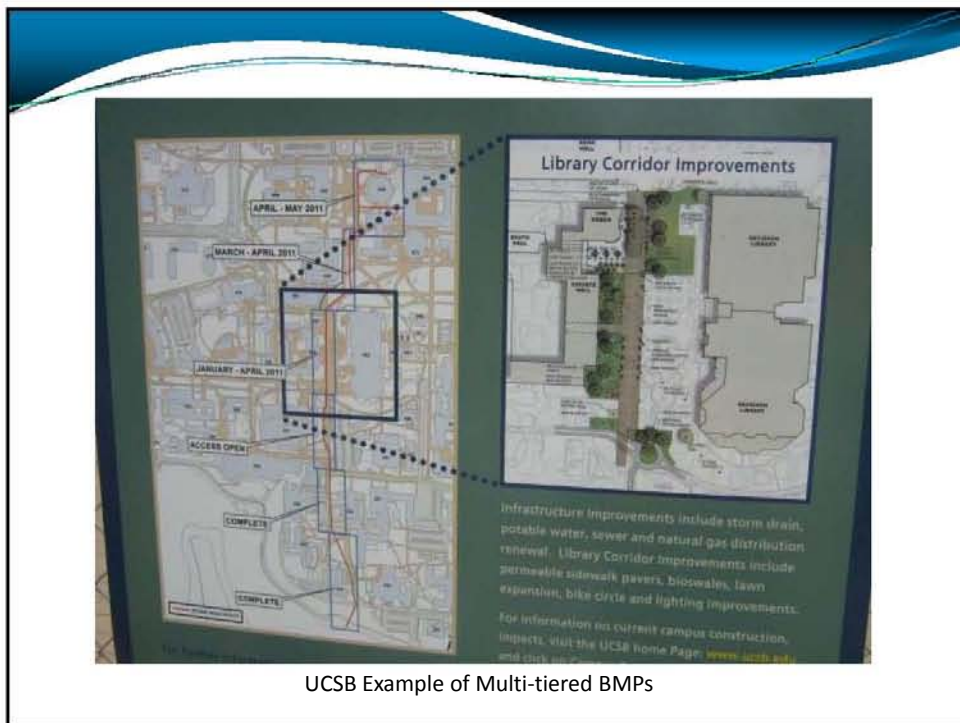
Considerations for Site Planning

- 1) Consider long-term storm water collection and treatment at the onset of the design
- 2) Understand the specific requirements and guidance
- 3) Evaluate proximity, conveyance routes, and types of receiving water(s)
- 4) Consider the types of pollutants that could be generated from the site and compare with established POCs and TMDLs




Considerations for Site Planning (cont'd)

- 5) Consider water quality AND water quantity BMPs and incorporation of LID techniques
- 6) Consider the benefits of LEED certification
- 7) Plan for multi-tiered BMPs
- 8) Consider the ultimate ownership and occupancy of the development project



UCSB Example of Multi-tiered BMPs

Multi-tiered BMPs



Porous pavers and rain gardens

followed by CDS unit

followed by a constructed wetland

Common Site Planning Problems

- Storm water collection and use of BMPs is an after-thought
- Site plans route storm water directly to receiving waters as quickly as possible
- Over reliance on “all eggs in one basket” approach
- For private projects, little consideration given to likely long-term success of BMPs
- For public projects, construction and maintenance crews engaged too late in the process
 - Design ultimately proves infeasible for construction or maintenance



Post-Construction BMP Selection

Considerations for Project Developer

- Have the BMPs been proven to be effective in the given conditions?
- Have the BMPs been approved by the control authority and adhere to regulations and design manuals?
- Can a multi-tiered approach be applied?
- Do BMPs address POC and TMDL concerns?
- Are the installation and O&M costs reasonable?


Considerations for Control Authority

- Will the BMP be effective at reducing POCs and maintaining pre-development hydrology?
- Is there a combination of source and treatment controls?
- Who will oversee proper installation of the BMP?
- What is the overall 'maintainability' of the BMP?
 - Accessibility?
 - Frequency?
 - Cost?
- Who will be responsible for long-term maintenance of the BMP?

BMP Selection Common Problems

- Lowest cost BMP selected
- Unproven performance and maintainability
- Doesn't match the POCs (e.g., CDS unit in nutrient impaired waters) and lacks redundancy
- After-thought and thus squeezed into site design resulting in undersized, ineffective, or non-maintainable BMPs
 - Site designer never visited the site
- Plan approvers lack technical knowledge for adequate review resulting in inappropriate and/or sized BMP
- In the case of an MS4, too many different types of BMPs deployed across their jurisdiction






Construction Oversight



Construction Oversight

- BMPs must be installed according to the specifications stated in the site plans
- **However design and construction problems do occur**
 - Does general contractor or subcontractor understand the intent and purpose of the BMPs?
 - Is there recurring and suitable oversight from the control authority?
 - Are the changes documented and approved?
 - Did they affect performance and sizing?



Ownership, Tracking, and Maintenance of Post-Construction Controls



Maintenance Responsibility

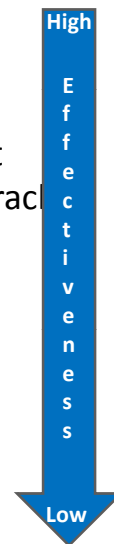
- The site owner is ultimately responsible for maintenance of the BMP
- BMPs may be owned by various entities
 - Public entities
 - Private developers
 - Homeowner's associations
 - U.S. military
- Written documentation of ownership and maintenance obligations is crucial
- Ownership may be transferred, but must be documented and in accordance with local laws

Examples of Ownership Transfer

- Private developer to home owner's association
 - Private developer to individual commercial business owner
 - Private developer to commercial business park owner
 - Private developer to public entity
 - Private developer to military
- Commonly observed issue:
- Post-construction control owner is not aware of the functions or intent (or even ownership) of the BMP, therefore, they have no idea of maintenance requirements. Quickly the post-construction control is not properly maintained and it no longer functions as designed.

Mechanisms for Ensuring Maintenance

- Maintenance contracts required at plan approval
- Annual certification of completed maintenance
- Use of a Computerized Maintenance Management System (CMMS) or equivalent which creates and tracks preventive maintenance
- Deed restrictions and lease agreements
- Periodic inspection
- Customer service request calls and emergency response
- 'Hope and pray'




Documentation and Tracking

- Maintenance activities must be documented
 - Documentation may be achieved with various methods (e.g., hardcopy field forms, Excel spreadsheet, CMMS)
 - Think like an inspector to evaluate whether your method is effective enough to prove the work was conducted
- Maintenance should be preventive rather than reactive
 - Scheduling and tracking maintenance activities is a key to an effective preventive maintenance program

Documentation and Tracking (cont'd)

- Examples of observed best practices:
 - Excel tracking sheet which describes the location and type of control and maintenance frequency - update tracking sheet to indicate next scheduled maintenance
 - Hardcopy (and/or scanned copies) of field forms used by maintenance crews to document the occurrence of maintenance activities and pertinent observations
 - Information maintained in CMMS for documentation and scheduling
 - Extensive use of GIS interlinked with property and tax record system and annual certification program



Best Practices – MS4 Implementation of Post-Construction Control Program



MS4 - Best Practice Example

1. Post-Construction Control Ordinance
2. At permit approval applicant must submit and certify to maintenance agreement
3. BMP built per design, as-built drawings, photos, and access considerations recorded in GIS or data system
4. Annual mailing of maintenance obligations is sent to owner requesting maintenance completion certification
5. Sites lacking certification are notified again
6. Those failing to maintain and certify are selected for inspection
7. Penalties and fees collected

MS4 – Elements of an Effective Program

- Requires preferred BMPs oriented towards POCs and other preferences (e.g., performance, maintainability)
- Conducts effective reviews of site plans and construction
- Requires ongoing maintenance via enforceable mechanism
- Tracks BMP attribute information
- Maintains copies of maintenance agreements and plans
- Proactively maintains publicly-owned BMPs at appropriate frequency and keeps organized records
- Assesses privately-owned BMPs at regular frequencies to ensure performance
- Routinely assesses program performance, plans improvements, and evaluates future regulatory changes

Questions?

