# Army Hawaii Responds to Federal Storm Water Management Requirements

*by Hayley Diamond*

Sustainable water management is not new to U.S. Army Garrison, Hawaii. There will be much less storm water running off of newly constructed Army facilities in Hawaii in the coming years.

With the passing of the Energy Independence and Security Act (EISA) in 2007 and federal requirements for sustainable design and development, more storm water must be infiltrated where it falls; reducing runoff and preventing associated pollutants from entering nearby water bodies. Since 2007, the Army in Hawaii has either completed or initiated construction of multiple projects, ranging from a two-acre parking lot to a 128-acre campus with motor pools and offices, which comply with the EISA storm water management requirements.

Section 438 of EISA requires construction projects that exceed 5,000 square feet to maintain pre-development hydrology, which can be accomplished by retaining the 95th percentile storm on the site. The Environmental Protection Agency (EPA), appointed by Executive Order to create the guidance on complying with Section 438, states that historically only the largest storms (exceeding 95 percent) generate runoff in an undeveloped woodland area. By mitigating the loss of infiltration associated with development through green storm water infrastructure or low impact design techniques and best management practices, the Army can achieve regulatory compliance and improve nearby surface water quality.

Low Impact Design (LID) is both a site planning strategy (e.g., grade site to encourage drainage to vegetated areas and disconnect impervious surfaces) and the design of decentralized, small-scale BMPs, like bioretention, permeable paving and rainwater harvesting, to manage and treat storm water where it falls. The goal of LID is to retain the same amount of storm water on the site as prior to the project by infiltrating, evapotranspiring, capturing and using storm water. LID can have environmental, social and economic benefits, including storm water runoff volume and pollutant reduction, flood prevention, enhanced groundwater recharge, urban beautification and reduced energy demands.

Any storm water ➤

*Volunteers from the 70th Engineer Company, 65th Eng. Battalion, 130th Eng. Brigade, 8th Theater Sustainment Command, weed a bioretention facility on Schofield Barracks. Typical maintenance requirements for bioretention facilities include annual weeding and replacing of bark mulch cover. The 70th Eng. Co. learned about the importance of pollution prevention and helped to improve water quality in Hawaii. Photo by H. Diamond.*

*(continued from previous page)*

insulation, paint, plumbing fixtures, electrical conduits and wire/cable, and larger and more complex items such as cooling towers, standing seam metal roofing, exterior insulation finish systems, overhead electrical cranes, fans, boilers, and transformers.

These validated and accepted local materials provide flexibility, and allow public works staff to quickly and efficiently obtain the materials and equipment needed to maintain and operate their facilities on a daily basis.

Another way the district helps public works is through an indefinite delivery, indefinite quantity contract for enhanced commissioning authority and through the district's quality assurance branch.

Throughout the design and construction of a project, the commissioning authority reviews and ensures the key systems meet energy efficiency and user requirements. Once construction is complete, they ensure that the systems yield improvements in energy efficiency, plus they provide training to public works operations and maintenance personnel ensuring the staffs know how to properly operate their key building systems.

This helps garrison and units to catch mistakes, missing or incorrectly-installed equipment, minimizes occupant complaints and callbacks, reduces problems with indoor air quality and thermal comfort, and prevents premature equipment failure.

*POC is Chris Y. Kim, DSN 721-7043, Chris.y.kim@usace.army.mil*

*Chris Y. Kim, RA, PMP, LEED® AP is the chief of the Technical Review Branch, Engineering Division, USACE, Far East District.*

(continued from previous page)

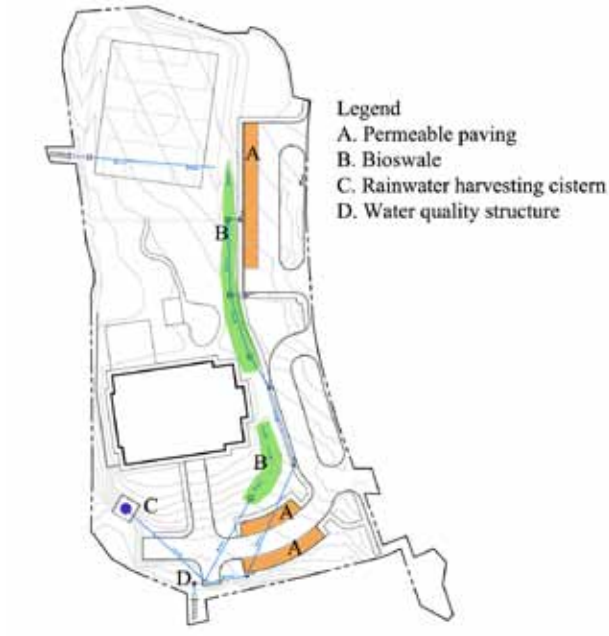
management system requires maintenance. Typically, an LID feature can be seen, and this visibility can lead to improved maintenance response. In contrast, a traditional storm water drainage system, with underground, piped infrastructure, can mask deferred maintenance issues until it may be too late to prevent a polluted discharge or flood.

LID proponents claim that green infrastructure practices can potentially reduce traditional utility maintenance costs. Regular pumping of a water quality structure or removing debris from underground lines and vaults does sound more intensive than weeding and annual replacement of mulch required for a bioretention system. However, LID is a relatively new approach to storm water management, and more projects and data will be needed to verify if there are cost savings associated with long-term operation and maintenance.

The EPA recently published a report entitled "The Importance of Operation and Maintenance for the Long-Term Success of Green Infrastructure," which outlines critical aspects of a successful maintenance plan. Aspects include having a written manual, documenting and tracking maintenance activities, training, partnerships and a dedicated funding source. Often, innovative solutions can compensate for the lack of a critical aspect. For example, partnerships can facilitate maintenance in the absence of a funding source as the Army in Hawaii has demonstrated.

In April 2012, the Directorate of Public Works Environmental Division organized the cleanup of the first bioretention facility constructed on Schofield Barracks. Installed in 2007 to treat runoff from a parking lot, the bioretention facility had never been maintained. With the support of the 70th Engineer Company, 65th Eng. Battalion, 130th Eng. Brigade, 8th Theater Sustainment Command, it took 16 soldiers and civilian volunteers approximately three hours to remove weeds and replace the two-inch bark mulch cover.

Subsequently, an article on the activity was published by 2nd Lt. Lauren Looper in the Hawaii Army Weekly, and the EPA chose to use an image of the activity in its "Maintenance of Low Impact Development" fact sheet, available online at http://water.epa.gov/polwaste/green/upload/bbfs6maintenance.pdf2013.




*Fort Shafter Child Development Center LID. Features include permeable paving, bioswales and rainwater harvesting. LID will improve water quality prior and provide educational opportunities for the Army community. Diagram by H. Diamond.*

| Acronyms and Abbreviations | |
|---|---|
| BMPs | Best Management Practices |
| EISA | Energy Independence and Security Act |
| EPA | Environmental Protection Agency |
| LID | Low Impact Design |
| USAG-HI | U.S. Army Garrison, Hawaii |

According to the EPA storm water runoff is the top cause of water pollution in the United States. The Army in Hawaii is doing its part in improving water quality in new development projects that incorporate sustainable storm water management practices. The challenge will continue to be the proper maintenance of both the LID features and traditional storm water drainage system to ensure regulatory compliance and improved water quality.

*POC is Shane Bourke, USAG-HI DPW Environmental Division, acting Clean Water Program manager, (808) 656-3105, shane.j.bourke.civ@mail.mil.*

*Hayley Diamond is a research specialist with U.S. Army Garrison, Hawaii's Directorate of Public Works Environmental Division, Clean Water Program.*

**Fort Shafter Child Development Center**

- Scheduled to be complete June 2014, the Fort Shafter Child Development Center will include various LID features to achieve compliance with Section 438 of EISA 2007.
- Permeable paving in parking stalls.
- Bioswales to capture and treat runoff from parking areas.
- Rainwater harvesting system to capture storm water that falls on the building's roof and using it for the drip irrigation system.