1. References.

a. Title 42, USC, Chapter 52, Section 17094, Section 438 Energy Independence and Security Act, December 2007.

b. Memorandum, Deputy Under Secretary of Defense (Installations and Environment), 19 Jan 10, subject: DoD Implementation of Storm Water Requirements under Section 438 of the Energy Independence and Security Act (EISA).

c. Memorandum, Assistant Secretary of the Army (Installations, Energy and Environment), ASA(IE&E), 16 Dec 13, subject: Sustainable Design and Development Policy Update.

d. Memorandum, ASA(IE&E), 20 Dec 12, subject: Water Goal Attainment Responsibility for Installations

e. Army Regulation (AR) 420-1, Army Facilities Management, Feb 2008

f. AR 210-20, Real Property Master Planning for Army Installations, May 2005

g. Unified Facilities Criteria (UFC) 2-100-01, Installation Master Planning, May 2012

h. UFC 3-210-10, Low Impact Development, Apr 2010

i. Army Low Impact Development Technical User Guide, Jan 2013

2. Introduction. Investing in and properly implementing low impact development (LID) features called best management practices (BMPs) will provide the Army with increased sustainable solutions and help the Army achieve Leadership in Energy and Environmental Design (LEED) excellence.

a. Incorporation of LID BMPs into the Army's construction program is the method used to meet requirements of Section 438 of the Energy Independence and Security Act (EISA), Department of Defense and Army policy regarding stormwater management. The design objective of LID is to maintain or restore the predevelopment (pre-project) hydrology of the property with regard to the temperature, rate, volume, and duration of flow. The pre-development hydrology is the hydrology of the site prior to the planned project being carried out.

b. Installation/activity commanders and installation managers, master planners, design engineers, stormwater program managers, maintenance personnel, land users, tenants, U.S. Army Corps of Engineers (Military Construction Army executive agent) and all construction contractors are integral to the successful implementation of LID within the Army's construction program. Effective master planning and site planning are

critical aspects of implementing sustainable practices across Army installations. If Army installations are truly to be sustainable, we must systematically change the way we manage stormwater which requires commitment to LID principles in the installation-wide visioning and planning processes as well as implementing these principles through area development plans and site specific planning actions.

3. Philosophy. A primary goal of this guidance is to refocus typical planning and storm water management practices through a paradigm shift to LID BMPs as solutions. The BMPs actively manage stormwater runoff by mimicking a project site's pre-development hydrology using design techniques that infiltrate, store, and evaporate runoff close to its source of origin. In planning and development of installations, we must plan more holistically, around designated area development districts. We must look at more multi-use and compact, multi-story solutions that reduce the development footprint, incorporating designs that limit impermeable surfaces including vast parking lots. Implementation of this guidance will reduce the number and size of typical stormwater construction practices i.e. curb and gutter, drop inlets, storm drain pipe and eliminate nearly all retention/detention ponds. This suite of approaches when properly implemented will maintain and/or restore pre-development hydrology and remove pollutants such as nutrients (nitrogen and phosphorus), oil and grease, and sediments from stormwater as well as free up usable land space by significantly reducing the use of retention and detention basins.

4. Applicability. At a minimum, construction and renovation projects regardless of funding source on Army installations, sites, enclaves and activities that disturb 5,000 SF or more in area (except projects limited to utility trenching activities, unless they are for the purpose of managing storm water in an open channel) are to meet the intent of this guidance and includes Government Owned Contractor Operated (GOCO) installations and all Army National Guard projects that receive federal funds; while it is encouraged for all other projects when not in conflict with State and local laws and procedures. Exceptions to policy and this guidance include privatization initiatives and medical facilities constructed using DoD Medical (DoDM) funding. At Joint Installations, the owning Service guides all construction policy and guidance. If the Navy or Air Force builds on Army installations, they will comply with Army policy and guidance. Overseas Commands, installations/activities will strive to achieve LID approaches consistent with applicable host nation requirements and operate in accordance with applicable international agreements, e.g., Status of Force Agreements.

5. LID Guidance and Support. The USACE Hydrology and Low Impact Development site: https://mrsi.erdc.dren.mil/sustain/cx/lid is used to house official documents, planning and design tools for use in development of Army projects. Army LID implementation will be accomplished using Army LID guidance "Army Stormwater Management Using Low Impact Development" (this document), the Army Low Impact Development Technical User Guide (see Best Practices section of the mrsi site), and the Army's LID Planning Tool and LID Cost Planning Tool (see Design Tools section of

the mrsi site). The Technical User Guide provides practical planning and design examples on how to construct successful LID BMPs. Additional support can be found in the Low Impact Development UFC 3-210-10 and Environmental Protection Agency (EPA) Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act. Other professionally recognized industry standards including guidance developed by the Service components should be considered if it is not available from the Army, Department of Defense (DoD) or EPA. Many Army, Service Component, DoD and Federal Agency LID references are available at the USACE Hydrology and Low Impact Development site referenced above.

6. Planning. A focus on area development planning provides an opportunity to optimize how we incorporate building, road and other infrastructure requirements with the need to manage stormwater.

a. Master Planning. The use of LID BMPs in the management of stormwater warrants a broad holistic approach that addresses the development of watershed areas across our installations, sites, enclaves and activities. The installation master planner shall include LID considerations throughout the planning and programming process. This includes the entire planning process from initial visioning through definition of Installation Design Guide principles, area development planning, and ultimately to the site planning level for specific facilities. The Installation Development Plan of the Real Property Master Plan (RPMP) identifies the citing of all development on an installation/ activity. Master planning will be conducted by the installation master planner and will consider all of the following:

(1) Use Area Development Planning Practices for Holistic District Planning. This allows planners to determine the broad planning requirements for a designated district on the installation, to include storm drainage management and use of LID features in conjunction with the long-term development plan.

(2) Embrace Compact Development Planning Patterns. Installations must conserve the land resources they have. Compact development patterns include multi-story buildings, greater residential densities, mixed-uses, and minimal spacing between buildings while maintaining consideration of AT/FP requirements. These features allow less land to be disturbed.

(3) Promote Infill Development Planning. Planners should, to the maximum extent possible, plan development within the installation core (existing cantonment area) using brownfields or previously developed land to conserve limited land resources. Access to existing built infrastructure including utilities and roadways must be considered.

(4) Use Appropriate Landscaping. Sustainable development requires the integration of regionally appropriate, local indigenous vegetation and landscaping across the installation/activity. Landscaping supports mission effectiveness, security, and future installation viability. Sustainable development strategies use landscaping and vegetation to improve the environment through controlling soil erosion, reducing heat island effect, and improving air quality.

(5) Use of Parking Lots and on-Street Parking. One planning approach to LID is to minimize the amount of new paved parking areas. To encompass this, planners are encouraged to retrofit existing paved areas including existing streets (where appropriate) to provide on-street parking instead of building vast new sprawling parking area. Where appropriate and funding is available, vertical parking structures will be given first consideration over larger horizontal parking lots.

(6) LID Integration. The integration of LID BMPs in the management of stormwater will enhance and support: The preservation of native vegetation, the disconnection and minimization of impervious areas, reduction of longitudinal slopes of swales and ditches, use of alternative roadway layouts that minimize imperviousness and heat island effect, the limitation of sidewalks to one side of roadways, on-street parking, the use of permeable paving materials, rainwater harvesting and direct drainage to vegetated areas including site development that encourages sheet flow.

b. Site Planning. Comprehensive planning criteria that support the principles of sustainable design and development, environmental, economic and community factors are to form the basis for achieving LEED silver construction. Site planning will include avoidance of natural resources, protected species, sensitive areas/habitats, and protected cultural resource sites. Stormwater is to be managed incorporating LID principles. Building orientation will provide for maximum energy efficiency taking into account heating ventilation and air conditioning requirements as well as water conservation including mechanical equipment condensate and stormwater harvesting in order to restore the pre-project hydrology. During the planning charrette event, the installation project planning team (Master Planner and Engineer) led by the Master Planner will present the approved site from which the project will be developed. Further, the Master Planner will provide a LID BMP strategy that meets stormwater policy, this guidance and the planning principles of the RPMP.

(1) Non-Structural LID BMPs (see the Army Low Impact Development Technical User Guide) should be incorporated into each project during the planning process in order to minimize site disturbance and overall project cost.

(2) Structural LID BMPs (see the Army Low Impact Development Technical User Guide) are planned, identified and updated from inception through the Parametric Definition Report (PDR) (Code 3) and the ENG 3086 using the LID Planning and Cost

Planning Tools. Use of LID BMPs that are both appealing and efficient can easily be implemented to meet water quality and quantity requirements for most projects.

7. Implementation. In all instances LID BMPs are to be designed and constructed by professionals trained and experienced in LID implementation.

a. Execution Timeline. All current SRM (OMA and other non-MILCON) and FY15 MILCON funded projects, and beyond, are to be planned, designed and budgeted to fully incorporate LID BMPs. Low impact development BMPs will be identified as the means to manage all increases in stormwater runoff where project request for proposals (RFP) and invitation for bid (IFB) packages reference stormwater solutions. No solicitation packages will reference stormwater management criteria/standards from installation design guide (IDG) material unless it meets the intent of Army LID policy and this guidance. In instances where IDGs have not been updated to meet Army LID policy and guidance, this guidance may be referenced.

b. Requirements. When new construction or renovation activities on sites 5,000 SF or greater in size increase the amount of runoff (based on an increase in runoff curve number), the increased amount of runoff is required to be managed on-site using LID BMPs. Water quality and quantity criteria must be met in order to comply with the requirements established in Section 438 of EISA. Special consideration must be given to the planning and design of LID BMPs on installations/activities where State and/or local regulations already exceed EISA 438 requirements. Planners and designers must be aware of LID BMP design capacities to ensure BMPs handle the appropriate quantity of water flowing from a site as well as provide the appropriate removal efficiency for pollutants. Installation/activity personnel are to give strong consideration to placing LID BMPs in series with one another in order to meet existing and planned/proposed water quality requirements to include Total Maximum Daily Loads (TMDLs).

(1) Site Boundary. It is highly recommended that the Master Planner/Engineer establish the "site boundary" (term used in LEED) as the limit of disturbance (LOD) on construction sites 5,000 SF or greater in size. The purpose for using this nomenclature is to ensure all LID BMPs are included within the "site boundary" for LEED scoring. The initial LOD is identified during the concept design and finalized during the design process. For this reason the estimated LOD (site boundary) should be identified and provide adequate space for LID BMP positioning.

(2) LID BMPs. Installation/activity Master Planners/Engineers are to complete both Army LID Planning and LID Cost Planning worksheets respectively at https://mrsi.erdc.dren.mil/sustain/cx/lid (note the Army LID Planning Tool is also available at the project Tab J, Storm Drainage/Low Impact Development worksheet of the DD1391).

(i) Each LID BMP "type" (bio-retention, swale, permeable paving, etc.) and "quantity" planned for use on the project is to be identified on a LID Planning worksheet. The process includes saving an Army LID Planning worksheet to your desktop computer, completing the worksheet, and attaching it to the Storm Drainage/Low Impact Development worksheet at Tab J of the DD1391. See Appendix A for an example on how an Army LID Planning Tool worksheet is developed.

(ii) The estimated cost for each planned LID BMP is calculated using the LID Cost Planning worksheet. The process includes saving a copy of the worksheet to your desktop computer and completing the worksheet. LID BMP costs are to be entered into Tab A of the DD1391. See Appendix B for an example on how an Army LID Cost Planning Tool worksheet is developed.

(iii) Installation/activity and USACE personnel must recognize that the incorporation of LID BMPs need only meet minimum requirements to satisfy EISA, OSD and Army policy. Conversely, Federal, state and/or local regulation may require LID BMPs meet stringent water quality standards and warrant construction of more complex LID BMPs including placing them in series with one another. In all instances the Army must balance constructing above and beyond what is required from a regulatory stand point with existing/planned regulatory requirements and constrained budgets.

(3) Runoff Calculations. The quantity of storm water required to be managed on-site using LID BMPs is calculated as the difference between pre-project and post project runoff from the site boundary delineated by the LOD, based on the "95th percentile storm event" and the project location "soil type". The amount of runoff required to be managed is calculated using Page 1 of the Army LID Planning Tool. The 1st step is to save a copy of the worksheet to your desktop computer; 2nd step is to enter project specific data including estimated acreage for pre and post construction land cover; 3rd step is to identify any increase in runoff volume (calculated by the spreadsheet at the bottom of page 1); 4th step is to develop a LID BMP strategy (using page 2) that includes a combination of different "types and quantities" of LID BMPs that is able to manage the increase in runoff (calculated by the spreadsheet at the bottom of page 1); 5th step is to save the worksheet on your desktop computer; and the 6th step is to attach it to the Storm Drainage/Low Impact Development worksheet at Tab J, DD1391. See Appendix A, Army LID Planning Tool (Note: the data developed in the example at Appendix A support the example project on "How to Incorporate LID in a DD1391" at Appendix C.

(4) LID BMP Strategy. Installation/activity Master Planners are responsible to develop the installation wide strategy for stormwater management including selection of LID BMPs for use in developing the LID strategy. The LID strategy is a concept specific to the project being planned and includes an estimate of both the type and number of each respective LID BMP planned for use including their configuration (some may be used in series with another). Both the increased quantity and quality of runoff need to

be taken into account when choosing the type, size, number and sequencing of LID BMPs planned for use. The second page of the Army LID Planning Tool is used to assist in determining the type and number of LID BMPs required. The installation DPW Master Planner and Engineer develop a LID BMP strategy to incorporate LID into the project during the site approval process, prior to planning charrette (PC). The strategy is developed using knowledge of the planned project and a site plan including drainage micro sheds across the planned project site.

(i) The LID Strategy is developed to ensure consideration is given to LID BMPs that may have special significance or effect on the overall project performance and in advance of the planning charrette (PC, Code 0) when other staff office personnel initiate input.

(ii) The Master Planner and Engineer use page two of the “Army LID Planning Tool” to identify each "type” and “quantity” of LID BMP being planned for use in the project. Note: There are six primary categories of LID BMPs typically used and include: bio-retention, grassy swale, permeable paving, rainwater harvesting, green roof and infiltration practice. Within these broad categories there are a multitude of BMP variations that can be developed. The completed worksheet is saved and attached at Tab J.

(iii) The Master Planner and Engineer develop a narrative that supports the LID BMP Strategy in the text box at Tab J, Storm Drainage/Low Impact Development worksheet of the respective DD1391 prior to the PC. The text box provides 400 lines to describe the strategy and should contain a comprehensive write-up for each type of LID BMP planned so the reader is able to develop an understanding of the significance for each BMP type including quantity, shape, size and function of LID BMP. See Appendix C, How to Incorporate LID in a DD1391, including the narrative to describe the strategy for the text box in Tab J.

(iv) Installation DPW in conjunction with PC Members increase fidelity in the LID BMP strategy (using the “Army LID Planning Tool” and resave data to Tab J) to ensure stormwater is managed in accordance with Army policy while working to meet the intent of the installation LID BMP strategy (PC, Code 0).

(v) Installation/activity DPW or the DD1391 preparer develops final proposed LID BMP narrative in Tab J, text box and inputs separate sub-line item(s) under Storm Drainage (Supporting Costs) with an estimated cost for each BMP in the detailed cost estimate in Tab A.

(5) LID BMP Design Stage. The following subparagraphs outline the general process involved in developing LID design. The USACE Geographic District/Executive Agent develops the LID requirement during the Code 3 process. Detailed instruction is

provided in accordance with the PDR and ENG 3086 requirements as defined in the USACE Code 3 Guidance (updated annually).

(i) USACE Geographic District develops/validates an estimate of the “increased runoff” during the design charrette (DC) (Code 3) (Use the Army LID Planning Tool).

(ii) Incorporate planned LID BMPs into the project definition report (PDR). LID BMPs must be designed to manage the increased amount of runoff. Both the increased quantity and runoff quality are to be taken into account when choosing the type, size, number and sequencing of LID BMPs planned for use.

(iii) USACE Geographic District develops cost effective plan/design to accomplish the installation LID BMP strategy (Reviewed and approved by the installation/activity Master Planner/Engineer). All USACE planned changes to the LID strategy are coordinated through the installation/activity DPW to develop consensus and approval. Low impact development is not to be cost engineered out of the project. (Code 3).

(iv) Refined estimates are developed for LID BMPs in the ENG3086 Cost Estimate. Low impact development BMPs reflected on the 3086 will be identified numerically with the word “LID (1), (2) etc.” in front of the description (see example in Appendix C). Approved ENG3086 is used to update Tab A cost estimates.

(v) Provide LID BMP designs and supporting documentation to support LID through the RFP process as necessary.

(6) Tracking LID BMP Strategy. For planning, design and cost estimating purposes, the project DD1391 for MILCON and DA4283 for Sustainment Restoration and Modernization (SRM) (OMA and other non-MILCON) funded projects should identify the type, number (quantity) and size of each type of structural LID BMP planned for use. The LID BMP data will be described in the PDR and ENG3086. Specific LID BMPs used in project planning and identified in the DD1391 should be included in the solicitation package and contract as appropriate, but may be changed based on the site conditions, design criteria and/or cost. Changes to the LID BMP strategy must meet the requirements of Army LID policy, EISA section 438 and state and local regulations. In all instances where modifications/wholesale changes to the LID BMP strategy (identified in Tab J of the 1391) are planned, the USACE Geographic District representative will coordinate with the installation/activity DPW, Master Planner/Engineer on proposed new LID courses of action and develop consensus on how to best meet LID requirements.

(7) Real Property Inventory. All structural LID BMPs meet the definition of real property and require a real property unique identifier (RPUID) number. LID BMPs are to be included in the accountable property systems of record (APSR), coded with a category code and included in the sustainment model. Appendix D contains a list of

temporarily assigned CATCODES that will be used until LID BMP CATCODES are developed.

(8) Operation and Maintenance. The LID BMP design engineers are responsible for providing installation/activity DPW staff with a BMP Owners Manual that identifies the BMP designed and constructed. The manual is required to contain the processes used to maintain the BMP to ensure proper operation. Long term operation and maintenance costs are to be incorporated in the decision process when determining which BMPs to install on a site.

8. General.

a. LID BMP Selection. Low impact development BMPs in the LID strategy and agreed upon by the installation/activity Master Planner and the USACE Geographical District are to be incorporated into the project design. Any changes to BMPs will be reviewed and agreed upon by the installation/activity Master Planner.

b. Site Management. Tree clearing and soil grubbing activities are to be reduced to the maximum extent possible, but are not to impede contractor requirements for storage, parking, delivery, and other specific project requirements, e.g. developing clear zones for airfield construction. Low impact development BMPs should be constructed within the LOD. Native vegetative cover will be maintained and replaced as necessary. Projects must take into account the location of protected species, sensitive areas/ habitats, and protected cultural resources sites, avoiding these areas whenever possible.

c. Ties to Traditional Stormwater Systems. Proper LID BMP designs may require drain disconnects, underdrain (overflow) connections or reconfigurations to existing and traditional storm sewer systems.

d. Stormwater Harvesting. Installation/activity Master Planners with projects located in jurisdictions that forbid stormwater harvesting (e.g. riparian water rights) are not required to consider stormwater harvesting BMPs. Stormwater harvesting is to be considered during all planning and design activities in order to meet both water quantity and quality requirements. Stormwater harvesting may be used to achieve numerous objectives all while managing runoff rate and volume. Stormwater use includes but is not limited to: process makeup water, irrigation, grey water (purple pipe), personal and tactical vehicle wash, and emergency fire fighting requirements. When a cost benefit analysis seems appropriate prior to BMP consideration it should take into account a minimum 50-year project period and use the 95^{th} percentile storm event. Calculations and supporting analysis must remain part of the design documentation.

e. Retention/Detention Ponds. Land is a dwindling Army resource. Stormwater retention and detention ponds take up valuable space, are not considered LID BMPs

and are highly discouraged. Planners and designers are to integrate traditional LID BMPs as solutions to manage stormwater including storage as necessary. The use of cisterns and/or the installation of interconnected pipe networks below parking areas to catch and hold runoff are just a couple of appropriate techniques. Site conditions of these storage areas including elevation/grade and soil conditions may necessitate pumping and other maintenance burdens to be included in garrison O&M requirements. It is imperative for garrison DPW staff including Operations and Maintenance personnel to understand the LID BMP strategy and support the O&M requirements to ensure proper BMP function once complete. Water storage under parking and drive areas accessible to tactical vehicles, e.g. Striker, MRAP and tanks must be given special consideration during scoping and budgeting to ensure proper project design. Retention ponds should be considered as a last resort and may be appropriate where they are designed for and made accessible to soldiers and their families, retirees and civilians for recreational use. Coordination must be made with the installation/activity Directorate of Public Works and the Directorate of Family, Morale, Welfare and Recreation (DFMWR) office that provides oversight/management for recreational purposes prior to design and construction. Documentation demonstrating coordination and approval by the DFMWR must be maintained in the project design documentation.

f. Training Areas. Building construction in training areas projects greater than 5,000 sq-ft in size will incorporate LID BMPs as the methodology to manage storm water. Construction of roadways, trails, ranges, pads etc. will incorporate LID BMPs to the greatest extent possible.

g. Demolition. Project activity including demolition must be evaluated to ensure any increased runoff from the site is managed using LID BMPs.

h. Stormwater Modeling. Installation/activity DPW Engineer and USACE Geographic District PMs are responsible for maintaining all pertinent site modeling data and calculations to include: Installation/activity name, name of Master Planner, LID Design Engineer(s), Project Name, Location (using GIS coordinates), Watershed Name (per state/EPA), 95th percentile rainfall, pre and post project runoff, and list of LID BMPs to be constructed.

(1) Practical Application. In all instances LID BMPs are to meet local, state and federal requirements for management of stormwater and will be incorporated into projects in an attempt to restore pre-project hydrology. As a general rule, EISA compliance is accomplished through management of the difference in pre and post project runoff from the 95th percentile rain event. This calculation is based on the difference in runoff coefficient for the pre and post project land cover. Each planned LID BMP is modeled to determine its ability to manage an amount of runoff. The quantity (cubic feet) of water that each LID BMP is capable of managing is cumulative across the site boundary and must be greater than the amount of increased runoff from the site.

(2) Watershed Approach. Installation DPW personnel have a responsibility to ensure they understand the overall watershed they are located in as well as the micro sheds they have oversight and responsibility for on their respective installations. Micro sheds can have a variety of unique challenges including: threatened and endangered species, historical properties, invasive species, soil instability and erosion, aggressive/ steep slope, current and planned development and associated runoff and others. It should be pointed out that modeling of LID BMPs using the LID Planning Tool (during the Planning Charrette and/or Design Charrette) may not be sufficient to address planned/future state requirements for water quality and/or quantity issues related to construction permits (see the Modeling Section in the Army LID Tech User Guide). Installation DPW personnel must remain knowledgeable of construction permit requirements and may be required to institute an enhanced modeling approach to meet future requirements. Modeling will be used to determine the effect of the planned project construction and results will be incorporated into the designated development area as cited in the installation master plan. To restore a site to pre-project hydrological conditions an installation/activity may need to consider a broad area/community or development approach. Project success may involve the cumulative effect of LID BMP initiatives, as single features by themselves may not be capable of restoring the site to pre-project hydrologic conditions.

i. Special Considerations. Planners and designers must be careful when planning to incorporate LID BMPs into parts of projects that have a potential to contribute to environmental contamination. As an example, LID BMPs designed for infiltration are not appropriate for use where end user activities include petroleum, oil and lubricants (POL) offloading, fueling, hazmat/waste loading/unloading, etc. Instead stormwater will be managed or diverted in such a way that any spills will minimize impact on the environment. In order to ensure integrity of the environment project planners and engineers may consider unique and innovative methodologies on the project under consideration and if necessary may apply LID mitigation initiatives to other areas within the watershed.

j. Exception to Policy. Garrison Commanders may request an exception to policy if LID BMP implementation would adversely affect mission performance, security, or Antiterrorism/Force Protection requirements, health, safety or welfare. In instances where the exception is directly related to the technical infeasibility of LID BMP performance the exception request will be provided as follows:

(1) The Garrison Commander submits a request through the chain of command; thru the Director, Operations Directorate, Office of the Assistant Chief of Staff for Installation Management (DAIM-OD); to the Deputy Assistant Secretary of the Army for Installations, Housing and Partnerships (DASA(IH&P)).

(2) The memorandum request is to include: Subject: Technical Infeasibility Report to incorporate LID in (Project Name), a summary statement that demonstrates

why LID BMP implementation is not practical for the specific project, the DPW master planner name, installation/activity address, email and phone number, the name of LID design engineer(s), project type considered, site location (using GPS coordinates), watershed name (per state/EPA), engineering calculations, geologic reports, hydrologic analyses and site maps.

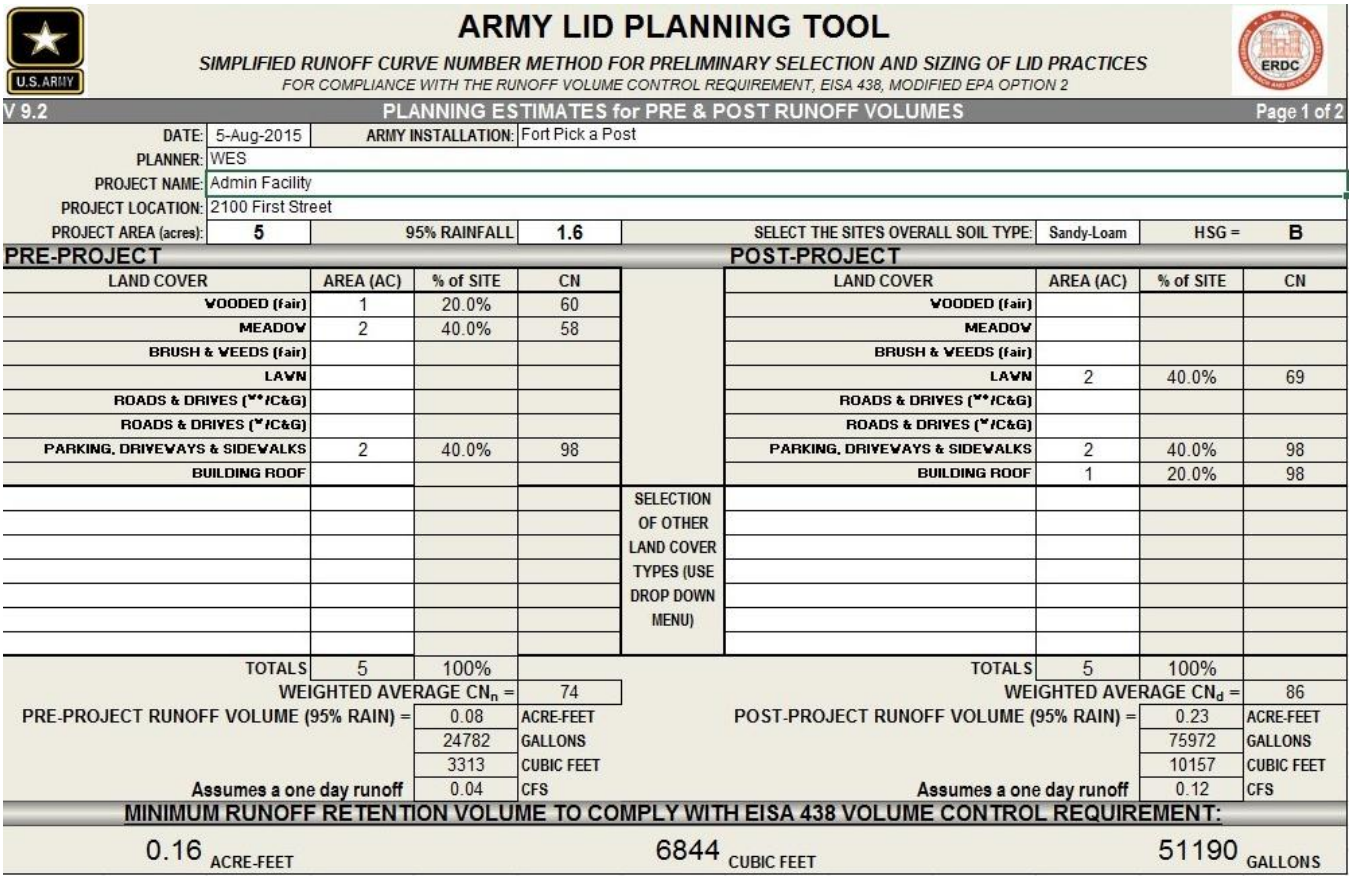
k. Reporting. Army achievement in meeting the intent of EISA is recorded through annual reports to OSD on accomplishments in meeting DoD, Strategic Sustainability Performance Plan (SSPP) sub-goal 2.3; the percentage of projects completed that, Maintain Pre-Development Hydrology to the Maximum Extent Technically Feasible, (Development and Redevelopment Projects of 5,000 Square Feet or Greater).

(1) Each installation/activity that has a project completed on their grounds regardless of funding source and with a LOD greater than 5,000 sq-ft in size is to provide a report including all data elements identified in Appendix E, Maintaining Hydrology on Army Construction Projects. The report must be filed electronically using a file format that will be provided to land holding commands. Project reporting is to be completed by 31 October for all projects completed in the previous fiscal year (FY). Reporting is to include all new construction and redevelopment projects for DECA, AAFES and tenant organizations completed on installation/activity grounds during the fiscal year of report. All reporting is the responsibility of the installation/activity DPW.

(2) The following example contract language is provided for use in the event a garrison/activity commander should choose to have the project Designer of Record, develop the required reporting data elements. Example contract language: The Designer of Record shall determine the Low Impact Development Volume required to be retained on site (difference between pre-project and post-project runoff, ft^3) and complete section A-E of the Maintaining Hydrology on Army Construction Projects reporting form, see attached (attach the form). The Army is required to report as-built conditions of low impact development features for completed projects to demonstrate pre-project hydrology is maintained. Therefore, the Designer of Record shall provide the completed reporting form to the Installation Directorate of Public Works or equivalent as part of the DD Form 1354 Transfer and Acceptance of DoD real property contract close-out process.

l. Mitigation. The construction of LID BMPs may provide mitigation credits or offsets for use in meeting local, state or Federal requirements related to installation/activity discharges. Installation/activity personnel should check with their local and state agencies to determine if a LID mitigation program exists. These LID projects may be located in previously developed or disturbed areas. As a general rule, projects located within the same watershed receive increased support.

APPENDIX A. Army LID Planning Tool



ARMY LID PLANNING TOOL

SIMPLIFIED RUNOFF CURVE NUMBER METHOD FOR PRELIMINARY SELECTION AND SIZING OF LID PRACTICES

FOR COMPLIANCE WITH THE RUNOFF VOLUME CONTROL REQUIREMENT, EISA 438, MODIFIED EPA OPTION 2

V 9.2 — PLANNING ESTIMATES for PRE & POST RUNOFF VOLUMES — Page 1 of 2

DATE:	5-Aug-2015	ARMY INSTALLATION:	Fort Pick a Post
PLANNER:	WES		
PROJECT NAME:	Admin Facility		
PROJECT LOCATION:	2100 First Street		
PROJECT AREA (acres):	5	95% RAINFALL	1.6

SELECT THE SITE'S OVERALL SOIL TYPE: Sandy-Loam — HSG = B

PRE-PROJECT

LAND COVER	AREA (AC)	% of SITE	CN
WOODED (fair)	1	20.0%	60
MEADOW	2	40.0%	58
BRUSH & WEEDS (fair)			
LAWN			
ROADS & DRIVES (w/C&G)			
ROADS & DRIVES (w/C&G)			
PARKING, DRIVEWAYS & SIDEWALKS	2	40.0%	98
BUILDING ROOF			
TOTALS	5	100%	
WEIGHTED AVERAGE CN_n =			74

POST-PROJECT

LAND COVER	AREA (AC)	% of SITE	CN
WOODED (fair)			
MEADOW			
BRUSH & WEEDS (fair)			
LAWN	2	40.0%	69
ROADS & DRIVES (w/C&G)			
ROADS & DRIVES (w/C&G)			
PARKING, DRIVEWAYS & SIDEWALKS	2	40.0%	98
BUILDING ROOF	1	20.0%	98
TOTALS	5	100%	
WEIGHTED AVERAGE CN_d =			86

SELECTION OF OTHER LAND COVER TYPES (USE DROP DOWN MENU)

PRE-PROJECT RUNOFF VOLUME (95% RAIN) =	0.08	ACRE-FEET
	24782	GALLONS
	3313	CUBIC FEET
Assumes a one day runoff	0.04	CFS

POST-PROJECT RUNOFF VOLUME (95% RAIN) =	0.23	ACRE-FEET
	75972	GALLONS
	10157	CUBIC FEET
Assumes a one day runoff	0.12	CFS

MINIMUM RUNOFF RETENTION VOLUME TO COMPLY WITH EISA 438 VOLUME CONTROL REQUIREMENT:

0.16 ACRE-FEET — 6844 CUBIC FEET — 51190 GALLONS

Page 1. This work sheet assists the user in determining the volume of runoff that needs to be managed to comply with EISA Section 438, using the difference in runoff between pre- and post-project conditions for the 95th percentile storm. The inputs include the acreage of the project site, the 95th percentile rainfall, the soil type, the pre-project land cover acreages and the proposed post-project land cover acreages. The output is the minimum runoff volume required to be managed on-site.

APPENDIX A. Army LID Planning Tool

ARMY LID PLANNING TOOL

SIMPLIFIED RUNOFF CURVE NUMBER METHOD FOR PRELIMINARY SELECTION AND SIZING OF LID PRACTICES
IN COMPLIANCE WITH THE RUNOFF VOLUME CONTROL REQUIREMENT, EISA 438, EPA OPTION 1

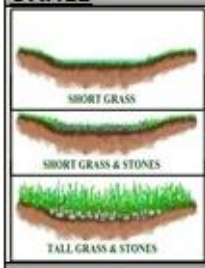
V 9.2 — PLANNING ESTIMATES for LID BEST MANAGEMENT PRACTICES — Page 2 of 2

BIO-RETENTION

(*) Based on an INFILTRATION RATE of 9.743 (Inches/Day) for soils in Hydrologic Soil Group B

PROPOSED BIO-RETENTION INFILTRATION AREA (square feet) =	8280	9.743
ESTIMATED RUNOFF INFILTRATION VOLUME (cubic feet) =	**6723**	

SWALE



(*) Based on an INFILTRATION RATE of 9.743 (Inches/Day) for soils in Hydrologic Soil Group B

SELECT SWALE TYPE =	TRAPEZOIDAL	SWALE LENGTH (ft) =	0	SWALE TOP WIDTH (ft) =	5
SELECT GRADIENT (ft/ft) =	0.008	SWALE DEPTH (ft) =	2	SWALE BOTTOM WIDTH (ft) =	2
SELECT SWALE SURFACE TYPE =	Short Grass, Few Weeds			MANNING'S 'n' VALUE =	0.027
EST. FLOW AREA (sf) =	0			Travel Time (seconds) =	0.00
Calculate — EST. FLOW DEPTH (ft) =	0.000044			Flow Velocity (fps) =	0.01
DESIGN FLOW (cfs) =	0.13			Estimated Runoff Infiltration Volume (cubic feet) for 1 day =	0
				Actual Runoff Infiltration Volume (cubic feet) for Swale Physical Features =	0
ESTIMATED RUNOFF INFILTRATION VOLUME (cubic feet) =					**0**

Note: Need to hit 'Calculate' button if you change any Swale input.

PERMEABLE PAVING

(*) Based on an INFILTRATION RATE of 9.743 (Inches/Day) for soils in Hydrologic Soil Group B

ASSUMPTION IS THAT THE SMALLER OF THE INFILTRATION RATE AND THE PRECIPITATION RATE CONTROLS

PERMEABLE PAVING AREA (square feet) =	1080	
STONE SUB-BASE VOID RATIO =	0.4	7.2
MINIMUM STONE STORAGE DEPTH (inches) =	6.00	
Void Storage Volume (cubic feet) =	216	
Estimated Infiltration Retention Volume (cubic feet) =	144	
INFILTRATION TIME from STONE SUB-BASE (days) =	0.20	
ESTIMATED RUNOFF RETENTION VOLUME (cubic feet) =	**144**	

[Estimate limited by the 95% RAINFALL. The available Retention Volume exceeds the required 95% RAINFALL]

RAINWATER HARVESTING

ROOF AREA DRAINING INTO BMP (square feet) =	10000		
ESTIMATED AVERAGE DAILY USAGE (gallons per day) =	1000		
DESIRED NUMBER OF SERVICE DAYS (3 - 7 days) =	5	STORAGE CAPACITY (gallons) =	5000
		ESTIMATED RUNOFF VOLUME (95% rain) (gallons) =	8594
ESTIMATED RUNOFF RETENTION VOLUME (cubic feet) =			**668**

[Estimate limited by USAGE RATE]

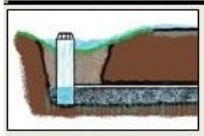
GREEN ROOF

VEGETATIVE ROOF AREA (square feet) =	0	
VEGETATIVE ROOF SOIL MEDIA DEPTH (inches) =	4	
SOIL MEDIA VOID RATIO =	0.3	
ESTIMATED RUNOFF RETENTION VOLUME (cubic feet) =	**0**	

Page 2. This worksheet assists the user in selecting LID BMPs and determining the estimated sizes of the LID BMPs to manage the required minimum runoff volume determined in Sheet 1 above. The interactive tool allows the user to select one or more BMPs and alter their dimensions to determine the size each BMP is required to manage the required runoff volume.

APPENDIX A. Army LID Planning Tool

INFILTRATION PRACTICE *(*) Based on an INFILTRATION RATE of 9.743 (Inches/Day) for soils in Hydrologoic Soil Group B*



INFILTRATION BED AREA (sqft) =	0	INFLITRATION BED DEPTH (ft) =	5	STONE VOLUME (cf) =	0
STONE SUB-BASE VOID RATIO =	0.4			INFILTRATION RATE FOR HSG (inches/day) =	9.743
		RUNOFF VOLUME STORAGE (cf) =	0	POTENTIAL INFILTRATION VOLUME (cf) =	0

ESTIMATED INFILTRATION VOLUME (cubic feet) = 0

VEGETATIVE FILTER STRIP

THE REDUCTION IN POST PROJECT RUNOFF FOR THIS LID PRACTICE IS ACCOUNTED FOR BY SELECTING IN AS ONE OF THE VARIOUS POST PROJECT "LAND COVERS" AND ENTERING SITE AREA PROPOSED FOR THIS USE.

REFORESTATION AND AFFORESTATION

THE REDUCTION IN POST PROJECT RUNOFF FOR THIS LID PRACTICE IS ACCOUNTED FOR BY SELECTING IN AS ONE OF THE VARIOUS POST PROJECT "LAND COVERS" AND ENTERING THE SITE AREA PROPOSED FOR THIS USE.

RIPARIAN BUFFER RESTORATION

THE REDUCTION IN POST PROJECT RUNOFF FOR THIS LID PRACTICE IS ACCOUNTED FOR BY SELECTING IN AS ONE OF THE VARIOUS POST PROJECT "LAND COVERS" AND ENTERING THE SITE AREA PROPOSED FOR THIS USE.

LEVEL SPREADER

LEVEL SPREADERS MAY INCLUDE A RUNOFF RETENTION COMPONENT, BUT ITS PRIMARY FUNCTION IS TO INCREASE FLOW TIME AND DECREASE FLOW RATES. SPREADERS WITH STONE BEDS THAT ALSO INFILTRATE WATER INTO THE GROUND CAN BE ASSESSED AS A LID INFILTRATION PRACTICE (1.1.7.)

CONSTRUCTED FILTER

FILTERS MAY INCLUDE A RUNOFF RETENTION COMPONENT, BUT ITS PRIMARY FUNCTION IS TO REMOVE POLLUTANTS. FILTERS WITH STONE BEDS THAT INFILTRATE WATER INTO THE GROUND CAN BE ASSESSED AS A LID INFILTRATION PRACTICE (1.1.7.) OR BIORETENTION PRACTICE (1.1.1)

SOIL RESTORATION

ALTHOUGH THIS LID PRACTICE REDUCES RUNOFF VOLUMES, THE VARIABLES ARE TOO COMPLEX FOR A GENERALIZED PLANNING ESTIMATE OF THE POTENTIAL RUNOFF REDUCTION

TOTAL VOLUME RETAINED ON SITE

ESTIMATED VOLUME RETAINED BY LID BMPs (cubic feet) = 7535

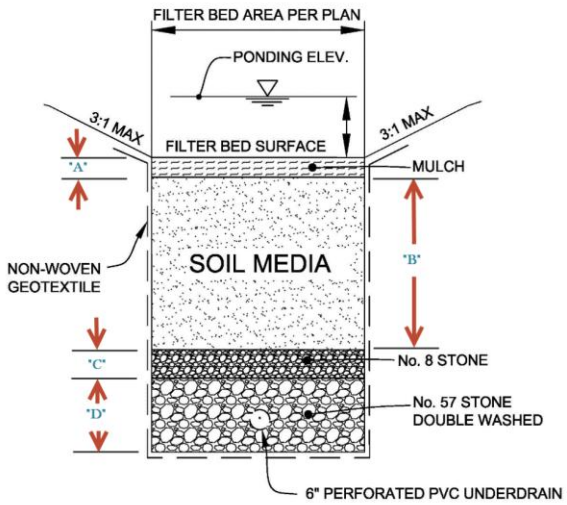
CHECK for EISA 438 VOLUME CONTROL COMPLIANCE

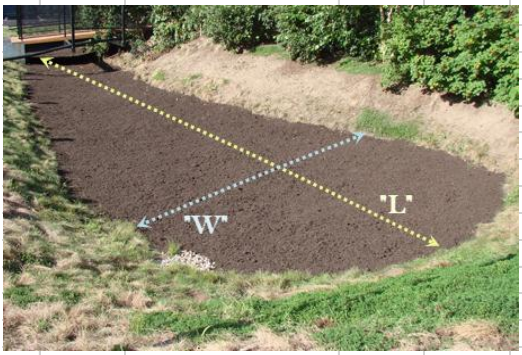
Since the Estimated Volume Retained of (7535 cf) is greater than or equal to the Minimum Retention Volume Requirement of (6844 cf), the selected LID Practices and sizes should be sufficient for compliance with EISA Section 438

Page 2 (Continued). This worksheet assists the user in selecting LID BMPs and determining the estimated sizes of the LID BMPs to manage the required minimum runoff volume determined in Sheet 1 above. The interactive tool allows the user to select one or more BMPs and alter their dimensions to determine the size each BMP is required to manage the required runoff volume. The bottom of the Figure shows the "Estimated Volume Retained by LID BMPs as 7535 cf and is ***more*** that the requirement of 6844 cf" (see bottom of page 1, A-1 above

APPENDIX B. Army LID Cost Planning Tool

LID (2) – This estimate is for a 6ft X 300ft bio-retention in the Example in Appendix B.
LID (2) BMP Cost = $108,239





A (in)	B (in)	C (in)	D (in)	W (FT)	L (FT)
3	24	4	12	6	300

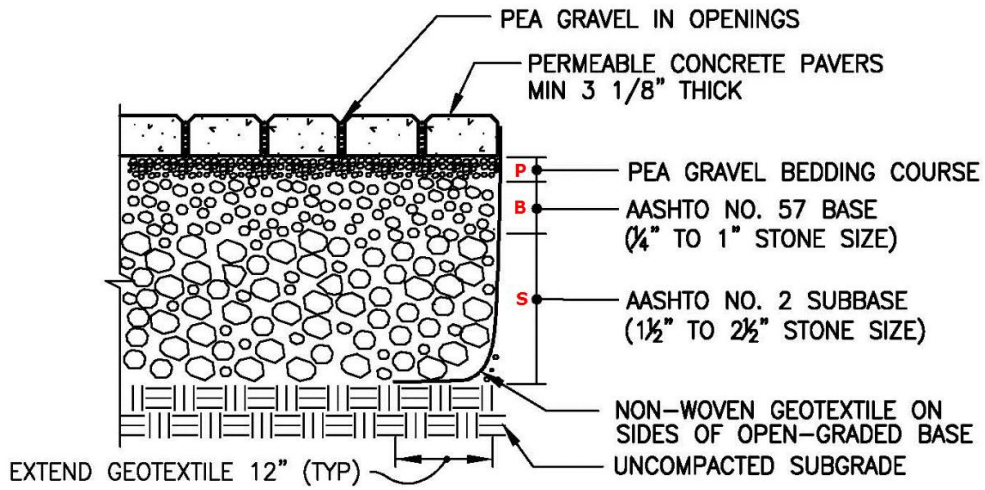
INPUT THE DIMENSIONS

BASED ON THE DIMENSIONS INSERTED ABOVE, THE ESTIMATED CONSTRUCTION COST ESTIMATE IS:

$	108,239

APPENDIX B. Army LID Cost Planning Tool

LID (2b) – This estimate is for a 6ft X 180ft permeable paver walkway in the Example Parking Lot in Appendix B.
LID (2b) BMP Cost = $53,496



P	B	S	W	L
(in)	(in)	(in)	(FT)	(FT)
2	4	12	6	180

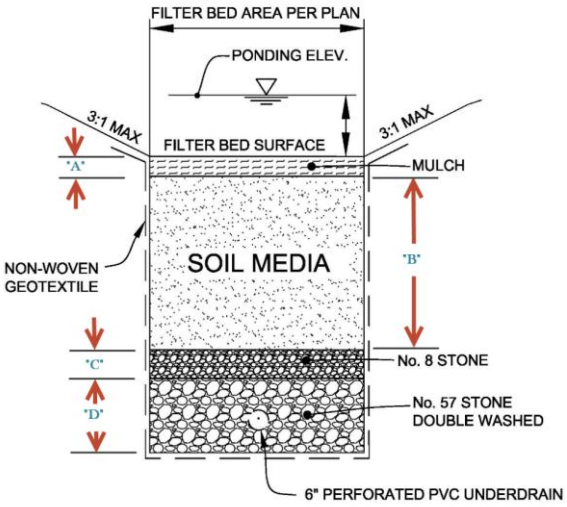
INPUT THE DIMENSIONS

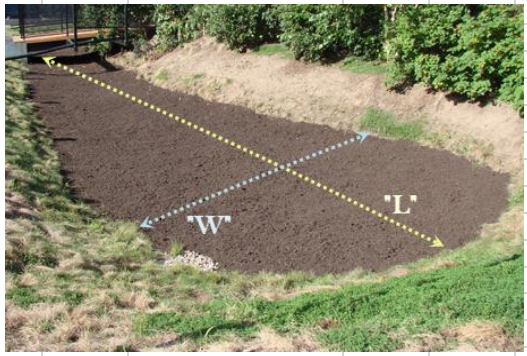
BASED ON THE DIMENSIONS INSERTED ABOVE, THE ESTIMATED CONSTRUCTION COST ESTIMATE IS:

$	53,496

APPENDIX B. Army LID Cost Planning Tool

LID (3a) – This estimate is for a 20ft X 50ft bio-retention (Rain Garden) along the west side of the building in the Example in Appendix B. This estimate is for 1,000SF of Rain Garden and the project calls for 3,000SF.
LID (3a) BMP Cost is 3 X $62,371 = $187,113.





A (in)	B (in)	C (in)	D (in)	W (FT)	L (FT)
3	24	4	12	20	50

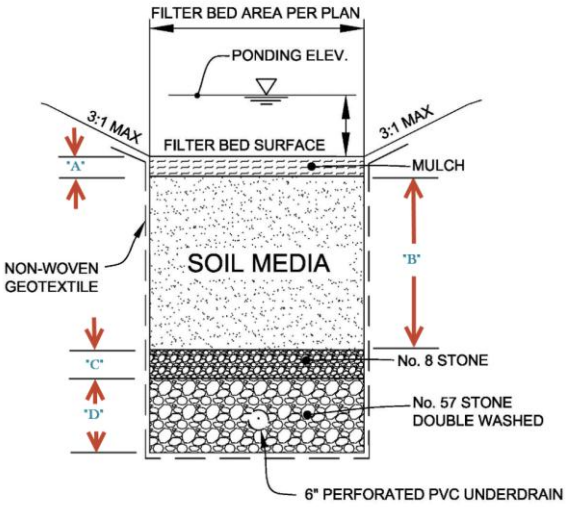
INPUT THE DIMENSIONS

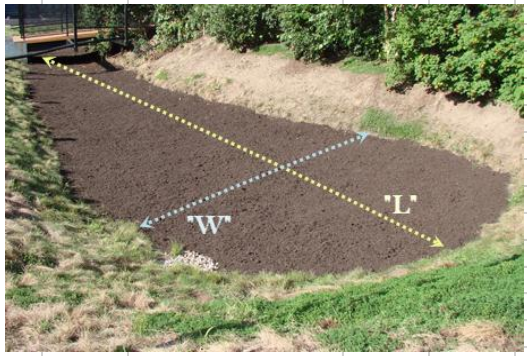
BASED ON THE DIMENSIONS INSERTED ABOVE, THE ESTIMATED CONSTRUCTION COST ESTIMATE IS:

$	62,371

APPENDIX B. Army LID Cost Planning Tool

LID (3b) – This estimate is for a 30ft X 50ft bio-retention (Rain Garden) to be located at the northwest corner of the building in the Example in Appendix B. This estimate is for 1,500SF of Rain Garden and the project calls for 3,000SF**.**
LID BMP Cost is 2 X $92,008 = $184,016.





A (in)	B (in)	C (in)	D (in)	W (FT)	L (FT)
3	24	4	12	30	50

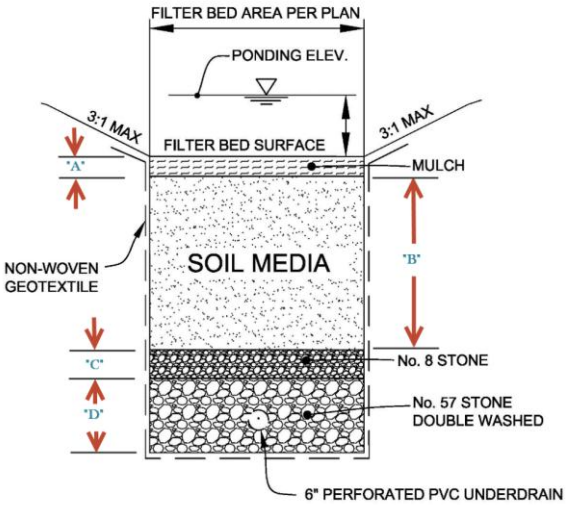
INPUT THE DIMENSIONS

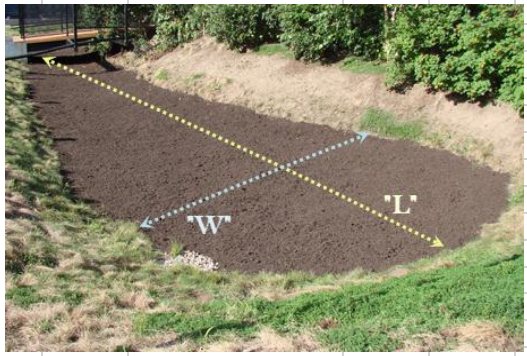
BASED ON THE DIMENSIONS INSERTED ABOVE, THE ESTIMATED CONSTRUCTION COST ESTIMATE IS:

$	92,008

APPENDIX B. Army LID Cost Planning Tool

LID (4) – This estimate is for a 6ft X 80ft bio-retention BMP along the northwest side of the building in the Example in Appendix B. This BMP is to discharge to a manmade Wetland LID BMP identified as LID (4a).
LID (4) BMP Cost = $32,567.





A (in)	B (in)	C (in)	D (in)	W (FT)	L (FT)
3	30	4	12	6	80

INPUT THE DIMENSIONS

BASED ON THE DIMENSIONS INSERTED ABOVE, THE ESTIMATED CONSTRUCTION COST ESTIMATE IS:

$ 32,567

Remaining LID BMP Cost Estimates: The current LID Cost Planning Tool is not able to develop cost estimates for the Wetland BMP or the Overflow Tie to Storm Sewer. The Cost Estimates provided for these BMPs at Step 6, Appendix B are notional and would require an engineer/cost estimator and actual site conditions in order to develop an actual estimate.
LID (4a) – Wetland accepts discharge from bio-retention and discharges through overflow to nearby Storm Sewer.
LID (4b) – Provide an overflow tie from Wetland to the Storm Sewer system.

APPENDIX C. How to Incorporate LID in a DD1391

1. Step One - The DD1391. The Master Planner identifies the need for a construction project and develops the shell for a DD1391. Tab J, Storm Drainage/Low Impact Development contains a link to the LID Planning Worksheet and is attached and updated through project development.

2. Step Two - The Limit of Disturbance and Runoff. In this example the project Limit of Disturbance (LOD) will be greater than 5,000 sf and includes construction on a proposed site that will result in an increase in runoff across the site boundary. The project will require implementation of LID best management practices (BMPs) to manage the increase in storm water runoff. The Master Planner develops an estimate for the site boundary defined as the LOD.

Determine Project LOD: The project is planned for construction at 2100 First Street, Fort Pick a Post. The standard design for the facility type will include approximately 1 acre of building roofline and 2 acres of parking, driveways and sidewalk hardstand. Approximately 2 additional acres of area surrounding the built infrastructure will be disturbed during construction and finished as open grassed area. The estimated LOD for this project is 5.0 acres.

3. Step Three - Runoff Calculation. Based on the estimated LOD, installation/ activity Master Planner/Engineer uses the Army LID Planning Tool found at Tab J, Storm Drainage/Low Impact Development Worksheet of a DD1391 or https://mrsi.erdc.dren.mil/sustain/cx/lid to calculate the estimated increase in runoff required to be stored/managed onsite. Calculations are based on estimated quantities for pre and post construction land cover.

Determine Runoff Quantity to be Managed/Stored on-Site. Save the LID Planning worksheet to your desktop computer and enter project information including the acreage for each type of Land Cover (for both pre and post project conditions), the 95^{th} percentile rainfall for the project location (1.6 inches in this example) and the project site soil type (Sandy-Loam, HSG = 8) **the increase in runoff required to be stored/managed onsite using LID BMPs is calculated as 6,844 cubic feet (cf).**

4. Step Four - The LID Strategy. The Master Planner develops a “LID Strategy” prior to the Planning Charrette (PC). The Strategy is nothing more than identifying a list of preferred LID BMPs (Non-Structural and Structural) that meet stormwater runoff policy and guidance, support the Master Planning Installation Design Guide (IDG) and enhance the overall architectural appearance of the project. The LID Strategy results from developing a list of LID BMPs planned for inclusion in the project and defined in narrative form in the Text Box at Tab J.

APPENDIX C. How to Incorporate LID in a DD1391

BMP Types and Quantities. Page 2 of the Army LID Planning Tool is used to form the basis (LID BMP types and quantities) for the LID Strategy. The LID BMP worksheet allows the user to input planned "types" and "sizes" of LID BMPs and the worksheet calculates the amount of runoff each BMP will manage/store. The following is an example of how LID may be portrayed on the worksheet.

a. Bio-Retention	Retain 6,723 cf
b. Permeable Paving	Retain 144 cf
c. Rainwater Harvesting	Retention 668 cf
TOTAL Runoff Stored/Managed	***7,535 cf****

* Note: For this example, the **LID BMPs planned store/manage *7,535 cf*** which is more than that **required from step 3, which was 6,844 cf.**

Develop the LID Strategy. The LID strategy is a listing of LID BMPs planned for use and input into the Text Box at Tab J, Storm Drainage/Low Impact Development. The following is an example of how an "early" version of the LID Strategy might look for this notional project.

LID (1) - Maintain yellow pine grove along south boundary and do not disturb sandy soils at northwest boundary.

LID (2) - Install a significant amount of bioretention BMPs across parking lot areas to include tree planting to reduce heat island effect. Plan for runoff sheet flow to bioretention and narrow strips of concrete pavers over water collection system (w/under drain) and tied to bioretention as accent to parking lot finish.

LID (3) - Construct rain gardens along west edge of LOD and at two opposing corners of the building (actual locations to be determined later, however strong consideration to be given to southeast and northwest corners as they have good slope from LOD and northwest corner also has existing storm water pipe to tie BMP overflow to as necessary).

LID (4) - Give strong consideration to enhanced bioretention (placing two or more BMPs in series) as water temperature and sediment are water quality concerns (see State TMDLs for installation).

APPENDIX C. How to Incorporate LID in a DD1391

LID (5) - Project has significant roofline area and high volume of personnel including troop activity. At a minimum consider rainwater harvesting to flush latrines planned for building foyer area.

5. Step Five - Refined LID BMP Planning at the Planning Charrette (PC). The Installation/activity Master Planner and Engineer lead a discussion on the "LID Strategy" at the PC. This is a time to bring up LID desires/must haves and concerns. The PC Team uses the latest version of the Army LID Planning Tool attached to the DD1391 and the base line LID Strategy (in the Text Box) as a starting point for developing a "Refined LID Strategy." The LID PC Team validates the estimated amount of runoff required to be managed onsite and 2) refines the LID Strategy including the type, number and size of proposed LID BMPs for use on the project (while accommodating as many of the Master Planner/Engineer desires as feasible). The LID Strategy saved to the Text Box narrative might be updated to look like the following:

LID (1) Conserve the stand of yellow pine along the southern boundary

LID (1a) Leave sandy soils along northwest boundary in place.

LID (2) Construct two 150ft long parallel bio-retention BMPs in the parking lot. Bio-retention is to have a 6ft X 4ft cross-sectional area and utilize parking lot slope to flow stormwater into the bio-retention BMPs. Do not install hard curb that would impede water flow to BMPs. BMP area is 2 X 6ft X 150ft = 1,800 SF. **BMP Storage is 1,461cf.**

LID (2a) Plant eight (8) Willow Oak trees at 50 foot intervals along the bio-retention.

LID (2b) Construct 180 linear feet of parking lot walkways at 6 foot width using permeable pavers. BMP area is 6ft X 180ft = 1,080 SF. **BMP Storage is 144cf.**

LID (3) Construct 5 Rain Gardens with Total Area = 6,000 SF (rain gardens can vary in size from one another and must total at least 6,000 SF).

LID (3a) Construct three (3) rain gardens along west side of the building. Install overflow/underdrain as necessary to surrounding slope. BMP area is 3 X 1,000 SF = 3,000 SF. **BMP Storage is 2,436cf.**

LID (3b) Construct two (2) rain gardens at the northwest corner of the building BMP area is 2 X 1,500 SF = 3,000 SF. **BMP Storage is 2,436cf.**

LID (4) Construct an 80 foot long bio-retention BMP along the Northwest portion of project site with an underdrain to a wetland feature that ties to the existing storm sewer. BMP area is 6ft X 80ft = 480 SF. **BMP Storage is 390cf.**

APPENDIX C. How to Incorporate LID in a DD1391

LID (4a) Construct a wetland at the discharge from the bio-retention along northwest portion of building in LID (4) above. Assume no BMP Storage. (BMP is designed for runoff to flow through a vegetated treatment train. No infiltration as BMP bottom is to be constructed using clay).

LID (4b) Construct an overflow connection from the existing storm sewer to the wetland in LID (4a) above.

LID (5) Install a 5,000 gallon elevated storage tank for latrine flushing. **BMP Usage is 668cf.**

6. Step Six – Develop LID Cost Estimate at Planning Charrette. Use the LID Cost Planning Tool at the following link https://mrsi.erdc.dren.mil/sustain/cx/lid to develop a cost estimate for each planned LID BMP (from Text Box) and enter into Tab A. Review each line of planned BMPs in the Text Box as some line items may have multiple BMPs identified. Input to Tab A may vary but should be developed using nomenclature similar to the following:

Storm Drainage Description	UM	No.	UC($)	Total ($)
LID (1) Keep Stand of Yellow Pine	NA	-	0	0
LID (1a) Leave Sandy Soils	NA	-	0	0
LID (2) Parking Lot Bio-Retention	SF	1,800	60.13	108,239
LID (2a) Plant Willow Oak Trees	EA	8	200	1600*
LID (2b) Permeable Paver Walkway	SF	1,080	49.53	53,496
LID (3a) Westside Rain Gardens	SF	3,000	62.37	187,113
LID (3b) Northwest Corner Rain Gardens	SF	3,000	61.33	184,016
LID (4) Northwest Bio-Retention	SF	480	67.86	32,567
LID (4a) Wetland BMP	EA	1	38,000	38,000*
LID (4b) Overflow to Storm Drain	EA	1	17,000	17,000*
LID (5) 5,000 (Gal) Storage Tank	EA	1	21,000	21,000*

Notes:
- The first two BMPs are to keep an existing stand of trees and sandy soil and does not cost anything.
* Costs associated with these BMPs are notional. Actual costs are project specific and need to be developed by a project designer and/or cost estimator.

7. Changes to the LID BMP Strategy. Changes to the BMP strategy may take place along the way through project development. In all instances installation/activity Master Planner/Engineer staff are to be coordinated with planned changes. These changes may take place during the Parametric Design Report (PDR) (Code 3) and Project Design (Code 6/7).

APPENDIX C. How to Incorporate LID in a DD1391

a. Parametric Design Report (PDR) (Code 3). The PDR results in a 15% design. The LID BMP data is updated in Tab J of the DD1391.

(1) PDR. A PDR consists of a 1391 review resulting in a refined scope of work and a completed ENG Form 3086 cost estimate. LID BMPs identified in Tab - J are refined during the PDR process and updated in Tab J of the 1391.

(2) ENG Form 3086. The ENG 3086 is a detailed cost estimate based on the scope of work in the PDR. Cost estimates for LID BMPs and developed during the PC are refined during the ENG Form 3086 and updated in Tab A.

b. Project Design (Code 6/7). The Designer of Record uses the information in the DD1391 as the starting point to identify installation Master Planner supported LID BMPs that meet Army Policy and Guidance.

Appendix D. LID BMP CATCODES

1. The following Category Codes (CATCODES) are for use when placing a LID BMP in the Accountable Property Systems of Record (APSR). These CATCODES are to be used until notified otherwise.

2. Table of LID BMP Assets and corresponding CATCODE.

LID BMP Asset	CATCODE	Long Name	(UM)
a. Bio-Retention	83180	(Gravity Oil and Grease Separator)	(KG)
b. Swale	87120	(Drainage Ditch)	(LF)
c. Permeable Pavement	85110	(Cantonment Area Roads, Paved)	(SY)
d. Rainwater Harvesting	84710	(Water Storage Tank, Nonpotable)	(GA)
e. Green Roof	11380	(Aircraft Loading Apron)	(SY)

3. Army Commands are to use the above CATCODES when entering data into the APSR. Some of the "long names" are closely associated with the LID BMP while others have no association. The intent of selecting CATCODES with "no association" was to pick a facility type that could have a maintenance cycle and cost that could resemble that of the LID BMP.

4. The HQDA is working to develop new CATCODES specific to each BMP Asset.

Appendix E. Maintaining Hydrology on Army Construction Projects

1. Installation/Activity Name	Name: City: State:
2. Project Name	
3. Project Street Address	
4. GPS Coordinates of Approximate Center of Site (from Google Earth)	Latitude: Longitude:
5. Project Description	
6. DD1391 Project Number	
7. Project Funding Source (*e.g. MILCON, OMA, etc*.)	
8. Installation Master Planner	Name: Email: Phone #:
9. USACE Geographic District	
10. USACE Project Manager	Name: Email: Phone #:
11. USACE or AE LID Designer of Record	Name: Email: Phone #:

Appendix E. Maintaining Hydrology on Army Construction Projects

SECTION B: EISA SECTION 438 LID CALCULATIONS To be filled in by LID Designer of Record (Reference UFC 3-210-10, Army LID Technical User Guide, and Army LID Planning Tool)	
12. Project Limit of Disturbance (LOD) (acres)	
13. 95th Percentile Rainfall Depth (*e.g. Baltimore, 1.6 inches)*	
14. Pre-Project Site Runoff Curve Number	
15. Pre-Project Runoff Volume (ft^3) (From LID Planning Tool)	
16. Post-Project Site Runoff Curve Number	
17. Post-Project Runoff Volume (ft^3) (From LID Planning Tool)	
18. LID Volume Required to be Retained on Site (Difference between pre-project and post-project runoff, #17 - #15, ft^3)	
19. Total Volume Retained on Site by LID BMPs (Infiltrated or Reused, ft^3)	
20. Does project comply with EISA? **YES** if Runoff Volume Retained on site (#19) is greater than or equal to Volume Required (#18). If **NO**, provide justification in #25.	

Note: The word “Retained” implies storm water is managed through infiltration to underlying soils or rainwater harvesting/reuse.

Appendix E. Maintaining Hydrology on Army Construction Projects

SECTION C: LID BMPS IMPLEMENTED						
21. BMP Type	BMP Location on Site	State Plane Coordinates (Northings and Eastings)	BMP Surface Area (ft^2)	Impervious Area Treated (ft^2)	Volume of Runoff Retained (ft^3)	BMP* Cost (000)
EXAMPLE: Bioretention	*SE corner of parking lot*	*N:518732.23 E:1388767.57*	*1500 ft^2*	*5000 ft^2*	*1000 ft^3*	*$47.3*

* LID BMP cost estimates are developed using the Army LID Planning Cost Tool.

SECTION D: OTHER STORMWATER MANAGEMENT REQUIREMENTS	
22. Name of Watershed project is located in (per State and/or EPA)	
23. If the installation/activity is required to comply with Total Maximum Daily Load regulations?	(Identify pollutants i.e. nitrogen, phosphorus)
24. Name of State and/or Local Stormwater Management Regulatory Authority (*e.g. Maryland Department of the Environment*)	

SECTION E: TECHNICAL INFEASABILITY	
25. If project does not fully comply with EISA, attach a technical infeasibility report to this reporting form.	Include all site constraints that prevent the project from full compliance (*e.g. engineering calculations, soil data, hydrologic analyses, geotechnical considerations, local water restrictions, etc.*)