Rainwater management

SS6 | Possible point

Glossary

Intent

To limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.

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To limit disruption and pollution of natural water flows by managing stormwater runoff.

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To reduce pollution and hydrologic instability from stormwater, reduce flooding, promote aquifer recharge, and improve water quality by emulating natural hydrologic conditions.

Limit disruption of natural water hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff, and eliminating contaminants.

Limit disruption and pollution of natural water flows by managing stormwater runoff.

To limit the disruption of natural hydrology by the building and grounds.

Limit disruption and pollution of natural water flows by managing stormwater runoff.

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Limit disruption and pollution of natural water flows by managing stormwater runoff.

Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, and managing stormwater runoff.

Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, and managing stormwater runoff.

Limit disruption and pollution of natural water flows by managing stormwater runoff.

Limit disruption of natural water flows by eliminating stormwater runoff, increasing on-site infiltration and eliminating contaminants.

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Limit disruption of natural water flows by minimizing stormwater runoff, increasing on-site infiltration and reducing contaminants.

To reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site, based on historical conditions and undeveloped ecosystems in the region.

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To limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.

To limit disruption and pollution of natural water flows by managing stormwater runoff.

Requirements

Option 1. Design storms

Case 1. Sites with existing imperviousness 50% or less

OR

Option 2. Percentile rainfall events

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[1]Natural Site Hydrology is defined as the natural land cover function of water occurrence, distribution, movement, and balance.

[2]Manage Onsite refers to capturing and retaining the specified volume of rainfall to mimic natural hydrologic function. This includes, but is not limited to, strategies that manage volume through evapotranspiration, infiltration, or capture and reuse.

[3]Low Impact Development (LID) is defined as an approach to managing stormwater runoff that emphasizes on-site natural features to protect water quality by replicating the natural land cover hydrologic regime of watersheds and addressing runoff close to its source. Examples include better site design principles such as minimizing land disturbance, preserving vegetation, minimizing impervious cover, and design practices like rain gardens, vegetated swales and buffers, permeable pavement, rainwater harvesting, and soil amendments. These are engineered practices that may require specialized design assistance.

[4]Green Infrastructure is a soil and vegetation-based approach to wet weather management that is cost-effective, sustainable, and environmentally friendly. Green infrastructure management approaches and technologies infiltrate, evapotranspire, capture and reuse stormwater to maintain or restore natural hydrologies (US EPA).

Option 1. Design storms

Case 1. Sites with existing imperviousness 50% or less

OR

Option 2. Percentile rainfall events

For projects that are part of a multitenant complex[1]

A multitenant complex is a master-planned development of stores, restaurants, and other businesses; retailers may share one or more services and/or common areas.

Projects may earn the credit if the complex as a whole meets the requirements.

Option 1

During the performance period, implement a stormwater management plan that infiltrates, collects and reuses runoff or evapotranspirates runoff from at least 15% of the precipitation falling on the whole project site both for an average weather year and for the 2-year, 24-hour design storm.

Implement an annual inspection program of all stormwater management facilities to confirm continued performance. Maintain documentation of inspection, including identification of areas of erosion, maintenance needs and repairs. Perform all routine required maintenance, necessary repairs or stabilization within 60 days of inspection.

OR

Option 2

Use Low Impact Development (LID)[1] practices to capture and treat water from 25% of the impervious surfaces for the 95th percentile of regional or local rainfall events.

Implement an annual inspection program of all stormwater management facilities to confirm continued performance. Maintain documentation of inspection, including identification of areas of erosion, maintenance needs and repairs. Perform all routine required maintenance, necessary repairs or stabilization within 60 days of inspection.

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[1]Low impact development (LID) is an approach to managing stormwater runoff that emphasizes on-site natural features to protect water quality by replicating the natural land cover hydrologic regime of watersheds and addressing runoff close to its source. Examples include better site design principles such as minimizing land disturbance, preserving vegetation, minimizing impervious cover, and design practices like rain gardens, vegetated swales and buffers, permeable pavement, rainwater harvesting, and soil amendments. These are engineered practices that may require specialized design assistance.

Alternative Compliance Paths (ACPs)

LEED 2009 EBOM reference guide supplement with India ACPs

LEED 2009 EBOM reference guide supplement with India ACPs

Implement a stormwater management plan that reduces impervious cover, promotes infiltration and captures and treats the stormwater runoff from 90% of the average annual rainfall[1] using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual postdevelopment total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if:

- They are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards.

OR

- There exists infield performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

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[1] There are 3 distinct climates in the United States that influence the nature and amount of annual rainfall. Humid watershed are defined as those that receive at least 40 inches of rainfall each year, Semiarid watersheds receive between 20 and 40 inches of rainfall per year, and arid watersheds receive less than 20 inches of rainfall per year. For this credit, 90% of the average annual rainfall is equivalent to treating the runoff from the following (based on climate): Humid Watershed - 1 inch of rainfall Semiarid Watersheds - 0.75 inches of rainfall Arid Watersheds - 0.5 inches of rainfall.

Implement a stormwater management plan that reduces impervious cover, promotes infiltration and captures and treats the stormwater runoff from 90% of the average annual rainfall[1] using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual postdevelopment total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if:

- They are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards.

OR

- There exists infield performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

For projects that are part of a multitenant complex[1]

A multitenant complex is a master-planned development of stores, restaurants, and other businesses; retailers may share one or more services and/or common areas.

The credit requirements may be met using a centralized approach affecting the defined project site and that is within the complex's boundary. Distributed techniques based on a watershed approach are then required.

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[1] There are 3 distinct climates in the United States that influence the nature and amount of annual rainfall. Humid watershed are defined as those that receive at least 40 inches of rainfall each year, Semiarid watersheds receive between 20 and 40 inches of rainfall per year, and arid watersheds receive less than 20 inches of rainfall per year. For this credit, 90% of the average annual rainfall is equivalent to treating the runoff from the following (based on climate): Humid Watershed - 1 inch of rainfall Semiarid Watersheds - 0.75 inches of rainfall Arid Watersheds - 0.5 inches of rainfall.

Implement a comprehensive stormwater management plan for the project that retains on-site, through infiltration, evapotranspiration, and/or reuse, the rainfall volumes listed in Table 1. Rainfall volume is based on the project's development footprint, any other areas that have been graded so as to be effectively impervious, and any pollution-generating pervious surfaces, such as landscaping, that will receive treatments of fertilizers or pesticides.

The percentile rainfall event (Table 1) is the total rainfall on a given day in the record that is greater than or equal to X percent of all rainfall events over a 20- to 40+-year period. For example, a 95th percentile event in a particular region might be 1.5 inches (40 millimeters), which would then be the volume to retain. To determine the volume to be retained, projects may use NOAA's published national rainfall data, run an approved stormwater model, or independently gather local rain gauge data and rank rainfall events. One hundred percent of the water volume from rainfall events up to the X percentile event must not be discharged to surface waters unless the harvested and reused runoff is authorized for discharge or allowed to be discharged into sanitary treatment systems.

Table 1. Points for retaining stormwater on-site

Percentile rainfall event (determines total volume from development footprint to be retained)	Points
80th	1
85th	2
90th	3
95th	4

Projects that earn at least 2 points under this credit may earn 1 additional point by meeting one of the following site characteristics:

a. The project is located on a previously developed site (1 point).
b. The project is located on a site that meets the definition of brownfield in SLL Credit 2, Brownfields Redevelopment (1 point).
c. The project is designed to be transit ready by achieving the following (1 point):

a. At least 2 points under NPD Credit 1, Walkable Streets.
b. At least 2 points under NPD Credit 2, Compact Development.
c. At least 2 points under NPD Credit 3, Mixed-Use Neighborhood Centers.

Select BMPs that are consistent with Green Infrastructure and Low Impact Development (LID)strategies such as the Washington State Department of Ecology's Stormwater management Manual for Western Washington, Volume V, Runoff Treatment (2005 edition), or a local equivalent. Choose BMPs that are the most stringent and appropriate to the project site and region. BMPs must also comply with all national, state, and local regulations.

For stormwater reuse systems not on a combined stormwater and sewer system, the total water reused for indoor use must not exceed 90% of the average annual rainfall.

Stormwater BMPs (except cisterns) must be designed to drain down within 72 hours.

Case 1 - existing imperviousness is less than or equal to 50%

Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year 24-hour design storms.

OR

Implement a stormwater management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies.

OR

Case 2 - existing imperviousness is greater than 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year 24-hour design storm.

Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

During the performance period, implement a stormwater management plan that infiltrates, collects and reuses runoff or evapotranspirates runoff from at least 15% of the precipitation falling on the whole project site both for an average weather year and for the two-year, 24-hour design storm. Implement an annual inspection program of all stormwater management facilities to confirm continued performance. Maintain documentation of inspection, including identification of areas of erosion, maintenance needs and repairs. Perform all routine required maintenance, necessary repairs or stabilization within 60 days of inspection.

Have a stormwater management plan in place over the performance period that is designed to mitigate runoff from the site. Mitigated stormwater is the volume of precipitation falling on the site that does not become runoff by leaving the site via means of uncontrolled surface streams, rivers, drains, or sewers. This mitigation can be accomplished through a variety of measures including perviousness of site, stormwater management practices (structural and non structural), capture of rainwater for reuse or other measures.

- SS Credit 5.1: Have measures in place on the site that mitigate at least 25% of the annual stormwater falling on the site. (1 point)
- SS Credit 5.2: Have measures in place on the site that mitigate at least 50% of the annual stormwater falling on the site. (1 point)

Case 1 - existing imperviousness is less than or equal to 50%

Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year 24-hour design storms.

OR

Implement a stormwater management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies.

OR

Case 2 - existing imperviousness is greater than 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year 24-hour design storm.

Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

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[1] There are 3 distinct climates in the United States that influence the nature and amount of annual rainfall. Humid watershed are defined as those that receive at least 40 inches of rainfall each year, Semiarid watersheds receive between 20 and 40 inches of rainfall per year, and arid watersheds receive less than 20 inches of rainfall per year. For this credit, 90% of the average annual rainfall is equivalent to treating the runoff from the following (based on climate): Humid Watershed - 1 inch of rainfall Semiarid Watersheds - 0.75 inches of rainfall Arid Watersheds - 0.5 inches of rainfall.

Case 1 - existing imperviousness is less than or equal to 50%

1. Discharge rate and quantity
   Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one- and two-year 24-hour design storms.

   OR

2. Stream channel protection
   Implement a stormwater management plan that protects receiving stream channels from excessive erosion by implementing a stream channel protection strategy and quantity control strategies.

OR

Case 2 - existing imperviousness is greater than 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year 24-hour design storm.

Implement a stormwater management plan that reduces impervious cover, promotes

infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

If existing imperviousness is less than or equal to 50%, implement a stormwater management plan that prevents the post-development 1.5 year, 24 hour peak discharge rate from exceeding the pre-development 1.5 year, 24 hour peak discharge rate.
OR
If existing imperviousness is greater than 50%, implement a stormwater management plan that results in a 25% decrease in the rate and quantity of stormwater runoff.

Construct site stormwater treatment systems designed to remove 80% of the average annual post-development total suspended solids (TSS) and 40% of the average annual post-development total phosphorous (TP) based on the average annual loadings from all storms less than or equal to the 2-year/24-hour storm. Do so by implementing Best Management Practices (BMPs) outlined in Chapter 4, Part 2 (Urban Runoff), of the United States Environmental Protection Agency's (EPA's) *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*, January 1993 (Document No. EPA 840B92002) or the local government's BMP document (whichever is more stringent).

Implement a stormwater management plan that results in: No net increase in the rate and quantity of stormwater runoff from existing to developed conditions; OR, if existing imperviousness is greater than 50%, implement a stormwater management plan that results in a 25% decrease in the rate and quantity of stormwater runoff.

Implement a stormwater management plan that results in: Treatment systems designed to remove 80% of the average annual post development total suspended solids (TSS), and 40% of the average annual post development total phosphorous (TP), by implementing Best Management Practices (BMPs) outlined in EPA's Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters (EPA 840-B-92-002 1/93).

Establishment

Use low-impact development (LID) practices to capture and treat water from 25% of the impervious surfaces for the 95th percentile storm event.

Establish and implement an annual inspection program of all rainwater management facilities to confirm continued performance.

Performance

Document the annual inspections, including identification of areas of erosion, maintenance needs, and repairs. Perform necessary maintenance, repairs, or stabilization within 60 days of inspection.

In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the percentile of regional or local rainfall events listed in Table 1, using low-impact development (LID) and green infrastructure.

Use daily rainfall data and the methodology in the U.S. 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 to determine the percentile amounts listed in Table 1. The percentile rainfall event indicates the total volume to be retained on site.

Table 1. Points for retaining rainwater on site

Percentile rainfall event	Points
80th	1
85th	2
90th	3
95th	4

Projects that earn at least 2 points under this credit may earn an additional point if the site meets one of the following criteria.

- The project is located on a previously developed site.
- The project achieves 1 point in SLL Credit Brownfield Remediation.
- The project is designed to be transit ready by achieving at least 2 points each under NPD Credit Walkable Streets, NPD Credit Compact Development, and NPD Credit Mixed-Use Neighborhoods.

Establishment

Use low-impact development (LID) practices to capture and treat water from 25% of the impervious surfaces for the 95th percentile storm event.

Establish and implement an annual inspection program of all rainwater management facilities to confirm continued performance.

Performance

Document the annual inspections, including identification of areas of erosion, maintenance needs, and repairs. Perform necessary maintenance, repairs, or

stabilization within 60 days of inspection.

Option 1. Percentile of rainfall events

Path 1. 95th percentile (2 points except Healthcare, 1 point Healthcare)

In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 95th percentile of regional or local rainfall events using low-impact development (LID) and green infrastructure.

Use daily rainfall data and the methodology in the U.S. 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 to determine the 95th percentile amount.

OR

Path 2. 98th percentile (3 points except Healthcare, 2 points Healthcare)

Achieve Path 1 but for the 98th percentile of regional or local rainfall events, using LID and green infrastructure.

OR

Path 3. Zero lot line projects only – 85th Percentile (3 points except Healthcare, 2 points Healthcare))

The following requirement applies to zero lot line projects in urban areas with a minimum density of 1.5 FAR. In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 85th percentile of regional or local rainfall events, using LID and green infrastructure.

OR

Option 2. Natural land cover conditions (3 points except Healthcare, 2 points Healthcare)

Manage on site the annual increase in runoff volume from the natural land cover condition to the postdeveloped condition.

Projects that are part of a multitenant complex only
The credit requirements may be met using a coordinated approach affecting the defined project site that is within the master plan boundary. Distributed techniques based on a watershed approach are then required.

Option 1. Percentile of rainfall events

Path 1. 95th percentile (2 points except Healthcare, 1 point Healthcare)

In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 95th percentile of regional or local rainfall events using low-impact development (LID) and green infrastructure.

Use daily rainfall data and the methodology in the U.S. 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 to determine the 95th percentile amount.

OR

Path 2. 98th percentile (3 points except Healthcare, 2 points Healthcare)

Achieve Path 1 but for the 98th percentile of regional or local rainfall events, using LID and green infrastructure.

OR

Path 3. Zero lot line projects only – 85th Percentile (3 points except Healthcare, 2 points Healthcare))

The following requirement applies to zero lot line projects in urban areas with a minimum density of 1.5 FAR. In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 85th percentile of regional or local rainfall events, using LID and green infrastructure.

OR

Option 2. Natural land cover conditions (3 points except Healthcare, 2 points Healthcare)

Manage on site the annual increase in runoff volume from the natural land cover condition to the postdeveloped condition.

Projects that are part of a multitenant complex only
The credit requirements may be met using a coordinated approach affecting the defined project site that is within the master plan boundary. Distributed techniques based on a watershed approach are then required.

CASE 1. Sites with Existing Imperviousness 50% or Less

Implement a stormwater management plan that prevents the post-development peak discharge quantity from exceeding the predevelopment discharge quantity calculated based upon a 24-hour rainfall that is equal to 30% of the average rainfall for the month with the highest average rainfall.

CASE 2. Sites with Existing Imperviousness Greater Than 50%

Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff calculated based upon a 24-hour rainfall that is equal to 30% of the average rainfall for the month with the highest average rainfall.

Implement a stormwater management plan that reduces impervious cover, promotes infiltration and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual post-development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards.