

Definitions of LID, Runoff Volume Match, Low Impact Fates & Runoff Volume Treatment



“Low Impact Development” or “LID” has been a popular term for over a decade, but there are many different interpretations of its meaning. The NC LID Guidebook states that LID “maintains and restores the hydrologic regime by creating a landscape that mimics the natural hydrologic functions of infiltration, runoff, and evapotranspiration.” This accurately describes the goal of LID, but it does not provide the public with a quantitative way to determine whether or not a given project implemented enough LID techniques to be considered an LID.

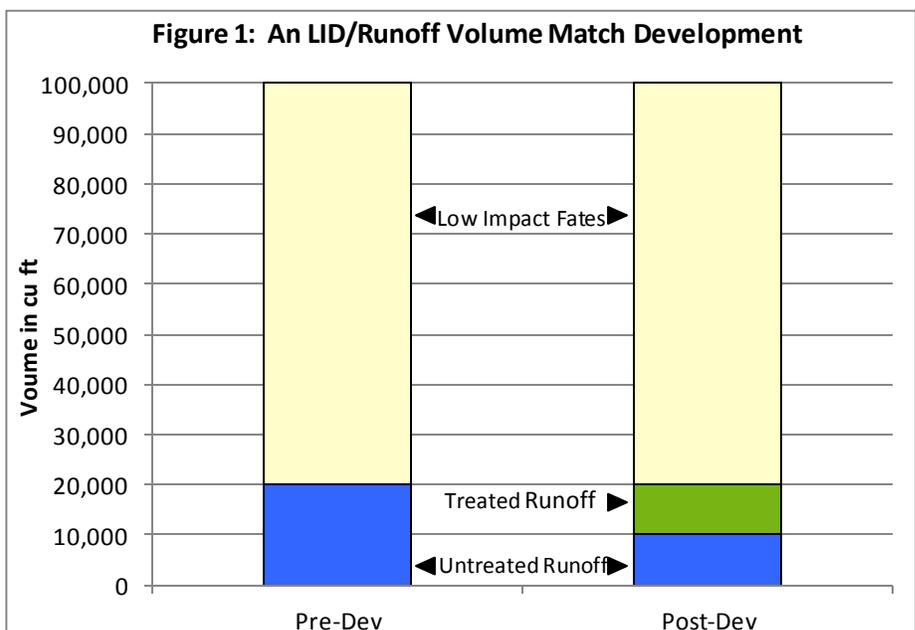
This definition was created by DENR in cooperation with a group of stakeholders that included engineering consultants, local governments, NC State University, the University of North Carolina, American Rivers and the NC Coastal Federation. These definitions and the Storm-EZ tool constitute **guidance** for the engineering and regulated community to provide additional tools that may be used on a voluntary basis to meet state stormwater rules and statutes.

LID & Runoff Volume Match

In North Carolina, **LID** shall be synonymous with **Runoff Volume Match**. DENR considers that LID and runoff volume match are achieved when the volume of runoff leaving the site after development is less than or equal to the volume of runoff before development.

Often the development community perceives that LID requires the use of multiple smaller stormwater control measures (SCMs); while this is certainly a reasonable approach to LID, it is not required. For example, a single centralized infiltration system is a valid strategy for creating an LID development. On a particular project, the owner may select any combination of LID techniques and receive corresponding runoff volume-based credits.

Storm-EZ is a spreadsheet permitting tool that accepts data about a project’s layout and SCMs. Then, Storm-EZ calculates how closely the project matches the pre-development runoff volumes. Storm-EZ may be used for any development project (even if it is not LID). In addition, Storm-EZ includes the stormwater permit application form and compiles an Operation and Maintenance booklet for development sites.



Low Impact Fates . . .

. . . are outcomes for stormwater runoff that do not cause hydrologic degradation to receiving waters. These include infiltration, evaporation, evapotranspiration, and rainwater storage and reuse. The SCMs that are most effective at bringing about low impact fates are infiltration systems, permeable pavement, bioretention cells (particularly when equipped with an upturned elbow), rainwater harvesting systems, green roofs and disconnected impervious surfaces. See Figure 1 above for a graphical representation of an LID/volume match site: total runoff post-development is equal to total runoff pre-development.

In addition to SCMs, site planning measures can be very effective at increasing low impact fates for stormwater. These measures include minimizing impervious surfaces and retaining vegetated areas, particularly wooded areas, on the site.

Runoff Treatment . . .

. . . is considered to have been achieved when a site does not successfully match pre- and post-development runoff volumes, but does, at a minimum, treat the entire difference between pre- and post-development runoff in a stormwater control measure that retains and releases stormwater. Sites that are runoff treatment can still benefit from using some low impact fate stormwater control measures, which will reduce the size of the retention systems that are needed.

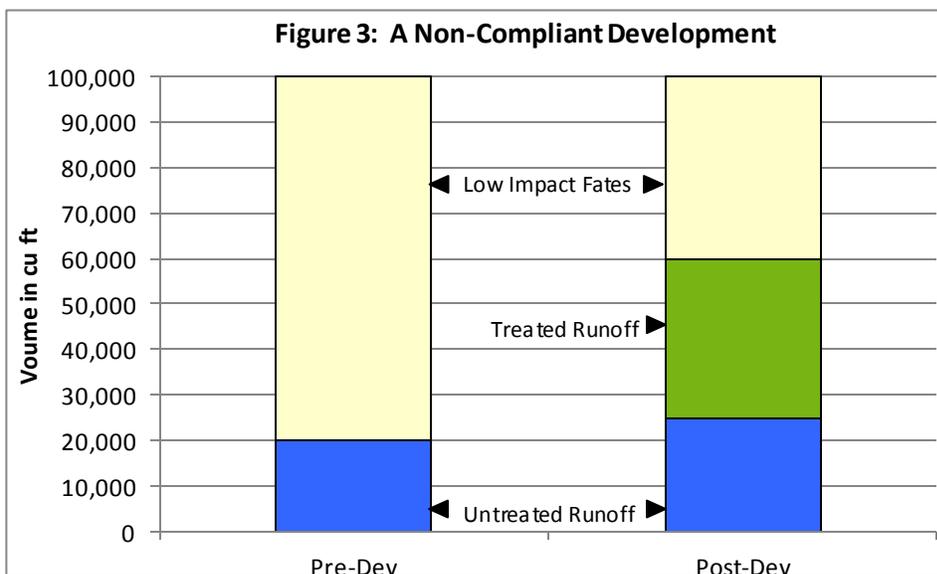
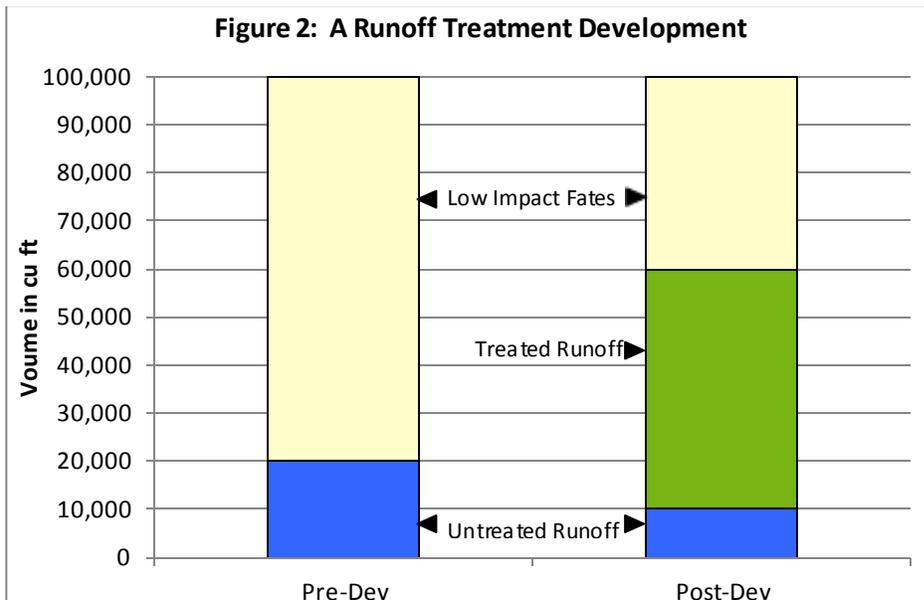
Figures 2 and 3 graphically depict a Runoff Treatment development and a noncompliant project, respectively. The noncompliant project has a greater volume of untreated runoff post-development than pre-development, which does not comply with state stormwater rules.

Potential Benefits of LID/Runoff Volume Matching

DENR does not offer any incentives for Runoff Volume Matching versus Runoff Treatment projects such as differences in permitting fees or review times.

However, the DENR believes that runoff volume matching approach may :

- Reduce “hard” infrastructure costs such as pipes and rip rap.
- Increase lot yields by eliminating the need for retention-based SCMs.
- Result in more vegetated areas interspersed with pavement and buildings.
- Reduce the need for flood control measures.
- Streamline future maintenance on the site (regular vegetation management rather than major overhauls of aging piped systems).



Runoff Volume Match: The Technical Details

Calculating whether a project has achieved runoff volume match requires the use of the NRCS Discrete Curve Number Method (USDA TR-55). “Discrete” means that the Curve Number Method is run twice: first, to yield runoff volume from the built-upon areas and second, to yield runoff volume from the remainder of the site. (The total runoff volume is the sum of the two results.) These calculations are automated in DENR’s Storm-EZ tool. The Discrete Curve Number Method shall be run for both the pre- and post-development conditions to determine if runoff volume match is achieved.

Runoff volume match shall be met for the 90th storm event in non-SA waters and the 1-year, 24-hour storm in SA waters.

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