Low impact development (LID) and green infrastructure (GI) are approaches to stormwater management that can improve water and air quality, enhance recreational opportunities, improve quality-of-life, protect ecosystem function, save energy, reduce the urban heat island effect, and alleviate the effects of climate change. These goals are advanced by LID and GI in ways that traditional “grey” infrastructure cannot match.

**WHAT IS LOW IMPACT DEVELOPMENT?**

Low impact development practices manage runoff in ways that reduce the impact of built areas and promote the natural movement of water within soils, ecosystems or a watershed. Applied on a broad scale, LID can maintain or restore a watershed’s hydrologic and ecological functions. LID employs principles such as preserving and restoring natural landscape features and minimizing impervious surfaces to create functional and appealing site drainage systems that treat stormwater as a resource rather than a waste product.

**WHAT IS GREEN INFRASTRUCTURE?**

Green infrastructure practices (also a low impact development tool) serve to manage runoff as an integrated part of the developed landscape by capturing runoff close to its source and weaving natural processes into the built environment. Practices use vegetation and soils to absorb and infiltrate excess runoff and remove pollutants. Implementing stormwater standards for development and protecting existing natural areas and land in river corridors are also part of the green infrastructure approach.
Benefits for Communities

**URBAN HEAT ISLAND EFFECT REDUCTION**

The urban heat island (UHI) effect occurs when built-up urban areas become warmer than nearby areas due to the amount of “hard surfaces” such as buildings, roads and parking lots. The UHI effect is of particular concern in summer, when higher surface air temperatures and solar radiation heat exposed surfaces. UHI can increase electricity demand, air pollution, and heat-related mortality and illness. LID and GI can mitigate the UHI effect through added shade and evapotranspiration in urban areas.

**ENERGY CONSERVATION AND CLIMATE CHANGE OFFSETS**

Green infrastructure can be adapted to address site-specific conditions to meet the anticipated challenges of climate change. Properly placed trees and natural vegetation can provide shade in summer and reduce wind speeds in winter, reducing the energy needed for heating and cooling. Trees and vegetation help to offset carbon dioxide emissions by removing pollutants from and cooling the air. Unlike some traditional grey infrastructure, GI installations do not need electricity to operate, so they do not produce greenhouse gas emissions.

**IMPROVED AIR QUALITY**

LID and GI improve air quality by incorporating vegetated areas that absorb pollutants, like ozone and nitrogen dioxide, intercept airborne particles, like dust, smoke, and pollen, and decrease carbon dioxide levels and increase oxygen levels. LID and GI help ponds, swamps and other water bodies from becoming toxic by limiting inflows of nutrients that cause massive algal blooms, the decay of which can create strong odors and rob the waters of life-sustaining dissolved oxygen.

**ENHANCED PROPERTY VALUES, RECREATION AND QUALITY OF LIFE**

GI and LID enhance neighborhood livability, in turn elevating property values, by beautifying yards and streets, increasing privacy, reducing noise pollution, providing urban agriculture opportunities, and creating or expanding attractive outdoor spaces. Healthy environments can promote community development and foster stronger community connections (via community tree planting programs, recreational activities, and social gatherings) that can reduce community costs for emergency response, crime, transportation, and water supply restoration.

Properties in LID neighborhoods have been shown to sell faster and for higher amounts than those in competing areas not using LID, in part due to proximity to open space and high-quality waterways. The significant improvements in water quality yielded by GI and LID can increase market value by 15% for properties bordering the waterbody. Similarly, LID has been shown to generate higher rents and lower vacancy and turnover rates. Therefore, protecting water quality helps boost tax revenues by enhancing local real estate values.

**PROTECTED ECOSYSTEMS**

GI and LID protect wildlife and habitats by enabling the ecosystem to perform its natural functions, like water restoration, nutrient recycling, and the capture and storage of carbon dioxide from the atmosphere. GI’s enhancement of native vegetation along streams keeps stream ecosystems healthy. The natural areas near streams, or “riparian buffers,” provide a number of ecological and water quality benefits by: filtering sediments and pollutants out of runoff before reaching streams; slowing runoff to allow it to soak into and be filtered by the soil; reducing erosion and stabilizing stream channels; allowing plants to absorb flood waters; providing shade that keeps stream water cool in summer so that it can hold more oxygen for use by fish and other aquatic species; and providing food and habitat for a number of land and water species. On a smaller scale, street trees and green roofs can provide nesting, migratory, and feeding habitat for a variety of birds, butterflies, bees, and other pollinating insects.

**OPERATION AND MAINTENANCE BENEFITS**

Natural systems are lower-maintenance, compared with conventional systems. LID uses small, cost-effective landscape features throughout developed areas to slow runoff, delay peak flows, increase evaporation, remove sediment, and remove pollutants. This maximizes water quality treatment and reduces the dangerous and damaging erosional forces of fast-moving waters. Protecting water quality through GI and LID practices is usually less expensive than cleaning contaminated water. LID’s decentralized approach reduces municipalities’ stormwater management costs by letting private landowners handle rain as it falls on their properties. This extends the useful life of central and underground infrastructure while reducing chemical, energy, and maintenance costs at treatment plants.

This project is funded by the NERRs Science Collaborative to a project team led by the University of New Hampshire Stormwater Center and the Great Bay National Estuarine Research Reserve.

It supports Green infrastructure implementation with local municipal, non-profit and private sector partners.

For more information please visit southeastwatershedalliance.org/green-infrastructure