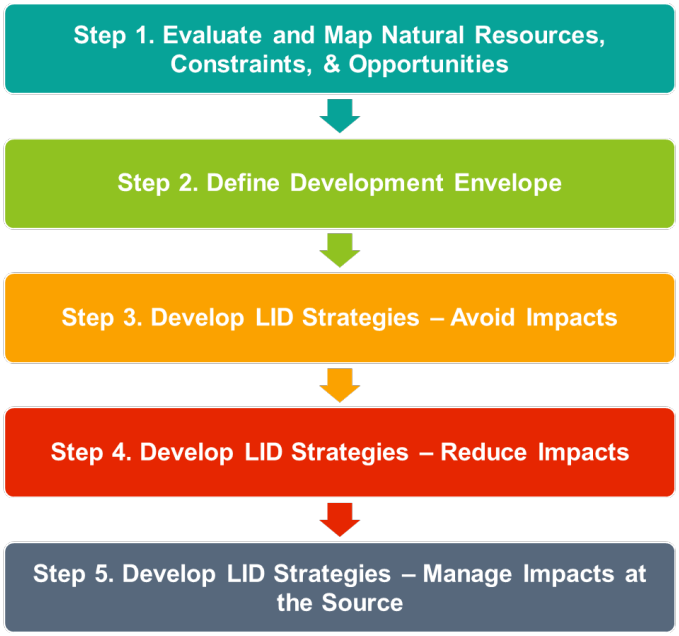
LID Site Planning and Design Process

Using LID successfully requires consideration of LID site planning and design strategies from the project's inception through final design. The LID site planning and design process focuses on the basic LID principles of preserving natural site characteristics and pre-development hydrology.

The recommended LID site planning and design process is shown schematically in Figure 5-2. LID Site Planning and Design Process. This process is most applicable to new development, although the same principles and strategies can be applied to redevelopment projects and retrofits.

Figure 5-2. LID Site Planning and Design



Once the local, state, and federal regulatory requirements and relevant stormwater management standards for a project are determined, the LID site planning and design process begins by evaluating and mapping existing natural resources as well as site constraints and opportunities for the use of LID techniques. The areas identified to be preserved in a natural state help define the remaining developable area or "development envelope" for the site. LID strategies are then applied within the development envelope to further avoid impacts, reduce impacts, and manage impacts at the source, in that order of priority, as described in the previous sections.

Appendix E contains a checklist for use by project proponents, designers, and reviewers to help document the consideration and use of LID site planning and design techniques to the "Maximum Extent Practicable," as described in Chapter 4 - Stormwater Management Standards and Performance Criteria.

Step 1. Evaluate and Map Natural Resources, Constraints, & Opportunities

The following natural resources, potential site development constraints, and opportunities for the use of LID techniques should be evaluated and shown on an existing conditions base map of the project site (also referred to as a "LID Site Planning and Design Opportunities and Constraints Plan").

Soils. Determine and map the major soil type(s) on the site and associated infiltration rates, erodibility, and other characteristics. General soils information can be obtained from the online USDA NRCS Web Soil Survey.

Wetlands, Rivers, and Streams. Show the boundaries of inland wetlands and watercourses (intermittent and perennial) on the site as delineated in the field by a Certified Soil Scientist or Professional Wetland Scientist. Assess the quality of each wetland system (functions and values) on the site using methodologies established by the U.S. Army Corp of Engineers. Field-verify upland soil types on the site during the field delineation. Show regulatory buffers such as upland review areas and applicable stream or riparian buffer requirements. Since regulatory buffers vary by municipality, it is important to consult with the municipal wetland staff early in the development of the site plan. Also, field-delineate and show unique or significant wetland types such as vernal pools and associated upland protection buffer areas.

Natural Drainage Patterns and Hydrologic Features. Map prominent hydrologic features such as seeps, springs, drainage swales, and isolated depression storage areas. Show existing drainage patterns on the base map, as verified in the field.

Vegetation. Identify and show the existing vegetation types (deciduous forest, coniferous forest, meadow, etc.) and patterns on the site including tree lines. Features such as tree clusters, grassy areas, tidal and/or inland wetlands vegetation, and unique vegetation should be shown. Include all significant tree species with a Diameter at Breast Height (DBH) of 24 inches and greater measured at 4.5' above ground surface.

Flood Hazard Zones. Delineate the limits of the 1 percent annual chance (100-year) flood on the site based on surveyed site topography and the base flood elevation shown on available flood insurance mapping and flood studies by the Federal Emergency Management Agency (FEMA).

Bedrock. Identify areas of shallow bedrock or ledge based on soils mapping, test pits or soil borings, and visible rock outcrops.

Topography and Steep Slopes. Show site topography at 2-foot contour intervals obtained from traditional field survey or aerial survey methods by a licensed land surveyor. For sites with slopes less than 2%, include spot elevations and 1-foot contours. Determine and show areas of steep slopes, which are defined as slopes of 25% (4H:1V slope) or greater as measured over a minimum distance of 50 feet.

Coastal Resources. Identify and show coastal resources on or adjacent to the site including tidal wetlands, beach soils, dunes, bluffs, escarpments, coastal flood hazard areas, coastal waters, estuarine embayments, intertidal flats, submerged aquatic vegetation, and shellfish concentration areas. If applicable, identify and show the location of the Connecticut Coastal Jurisdiction Line (CJL), which is the jurisdictional limit for tidal, coastal, and navigable waters.

Other Sensitive Areas. Identify and map other sensitive areas on or near the project site including but not limited to watercourses supporting cold water fisheries, waters with identified water quality impairments or approved Total Maximum Daily Loads (TMDLs), state and federal listed species and significant natural communities identified by the CT DEEP Natural Diversity

Database, terrace escarpments located in the Connecticut River valley, agricultural land (prime farmland, unique farmland, and farmland of statewide or local importance), and stone walls.

Step 2. Define Development Envelope

Determine the development envelope in which buildings, roads and other constructed features may be sited with minimal impacts to natural resources and site hydrology. Setting the development envelope should also consider construction techniques, and make efforts to retain and protect mature trees, minimize clearing and grading for buildings, access and fire prevention, and other construction activities, including stockpiles and storage areas. The envelope should also be confined to areas to be permanently altered. Limiting the development envelope also reduces the amount of site disturbance and impervious cover, thereby generating less runoff and requiring smaller stormwater management systems.

In general, the following steps should be followed to define the development envelope:

1. Determine those environmentally sensitive areas to be protected from development such as wetlands, watercourses, vernal pools, and their associated buffer areas (see Step 1).
2. Delineate the different vegetative cover types on the site. Highlight those areas of special characteristics or environmental sensitivities. Areas with concentrations of trees with a diameter at breast height (DBH) of 24 inches or greater should be noted on the plan.
3. Determine and delineate steep slopes (slopes greater than 25% or 4H:1V slope as measured over a minimum distance of 50 feet).
4. Determine and delineate those soil areas which have moderate to high infiltration rates (A and B soils). These areas should be reserved for impervious area disconnection or infiltration systems.
5. Once the above areas have been clearly delineated on the base plan, the remaining areas generally define the development envelope. Determine and define the pre-development runoff patterns on the site in order to provide a preliminary understanding of the sites' drainage patterns and the ultimate discharge points.

Step 3. Develop LID Strategies – Avoid Impacts

Once the development envelope is defined, utilize other LID strategies to further avoid impacts including minimizing soil compaction, minimizing site disturbance, and conservation or other compact development approaches, as described in the section titled Avoid Impacts.

Step 4. Develop LID Strategies – Reduce Impacts

Implement LID strategies to further reduce development impacts, such as minimizing the creation of new impervious surfaces, preserving the timing of site runoff to approximate pre-development conditions, and using low maintenance LID landscaping, as described in the section titled Reduce Impacts.

Step 5. Develop LID Strategies – Manage Impacts at the Source

Finally, after all reasonable efforts to avoid and reduce impacts are exhausted, manage any remaining stormwater impacts by disconnecting impervious surfaces (direct runoff to adjacent vegetated pervious areas or to structural stormwater BMPs), converting impervious areas to pervious surfaces, and implementing source controls and pollution prevention measures, as described in the section titled Manage Impacts at the Source.