

# LID Site Planning and Design Applications

LID site planning and design strategies can be applied in a variety of land use settings for new development and redevelopment projects. The following sections provide common applications of LID site planning and design techniques for residential development and commercial/industrial/institutional development. The use of LID site planning and design strategies for retrofits, including parcel-based and roadway or right-of-way retrofit applications, are addressed in [Chapter 9 - Stormwater Retrofits](#).

## Residential Development

### Compact Development

For new development, implement conservation or open space design strategies as much as possible to avoid impacts as described in the Section titled [Avoid Impacts](#) (e.g., minimize soil compaction and site disturbance; protect sensitive natural areas, vegetated buffers, and flow paths; and permanently set aside open space for multiple objectives including stormwater management).

### House Lots

- Orient lots and buildings to maximize opportunities for simple disconnection, use of infiltration-based structural stormwater BMPs, and conveyance of stormwater through the use of vegetated open channels including linear bioretention and water quality swales.
- Convey stormwater from lots not adjacent to pervious vegetated areas using swales or dispersed as low velocity sheet flow to areas more conducive to infiltration.
- Locate lots adjacent to preserved open space to improve aesthetics and privacy.
- Orient lots to use shared driveways to access houses along common lot lines.

### Roads

- Lay out roads and lots to minimize grading. Road alignments should follow existing grades to the extent possible.
- Consider reduced driveway widths and reduced front yard setbacks to limit driveway lengths.

- Use roadside vegetated open channels or swales as an alternative to traditional curb and gutter drainage (i.e., curbing, catch basins, and pipes) in low or medium density developments and where roadside erosion is not a concern (typically slopes of less than 8 percent).
- Use swales on one side of the road where roads with a cross slope are allowed. Otherwise, use a crowned road cross section and swales on both sides of the road.
- Completely eliminate curbing to promote sheet flow to roadside swales or use curb openings to convey gutter flow to roadside swales.
- For roads with grades generally greater than 8%, use catch basins and curb/gutter drainage, with catch basin outlets connected to roadside swales or other structural stormwater BMPs within the road right-of-way.

### Driveways

- Grade driveways to adjacent open space and lawn areas (simple disconnection), rain gardens, or water quality swales to retain and infiltrate runoff on the lot and prevent driveway runoff from reaching the road.
- Consider use of driveway infiltration trenches, which are stone-filled trenches along the edge of a driveway to collect water from the driveway, allowing it to soak into the ground and reducing erosion along the edge of the driveway.
- Consider use of permeable surfaces such as porous asphalt, porous concrete, permeable concrete pavers, grass pavers, plastic turf reinforcing grids, and geocells (cellular confinement systems).

### Roofs

- Direct roof downspouts to pervious vegetated areas (simple disconnection), dry wells or other small-scale infiltration systems (i.e., rain gardens), or to rain barrels for non-potable reuse such as lawn, landscape, or garden watering.

### Lawns

- Use low-maintenance LID landscaping techniques to minimize lawn area and maintenance needs (e.g., irrigation, fertilizers, and pesticides).
- Use diverse selection of native vegetation species.
- Create shade by maintaining existing tree canopy and preserving natural/wild areas.
- Maintain pre-development flow path lengths in natural drainage patterns.

## Commercial, Industrial, and Institutional Development

This section addresses LID site planning and design strategies for new development and redevelopment sites in commercial (office buildings, small commercial buildings, and big box retail), industrial, and institutional settings. These sites typically have larger building footprints and parking facilities, which can result in greater impervious cover and stormwater impacts. Such sites also present opportunities to reduce and manage stormwater impacts by minimizing and disconnecting impervious surfaces.

### Compact Development

- For new development, implement conservation or open space design strategies as much as possible to avoid impacts as described in the Section titled [Avoid Impacts](#) (e.g., minimize soil compaction and site disturbance; protect sensitive natural areas, vegetated buffers, and flow paths; and permanently set aside open space for multiple objectives including stormwater management).

### Parking Lots

- Lay out and grade parking lots to direct runoff to structural stormwater BMPs (e.g., bioretention, tree filters, and water quality swales) in parking islands and around the perimeter of parking facilities to retain and infiltrate stormwater and convey it to other structural stormwater BMPs if necessary. Eliminate curbing or use curb cuts to direct sheet flow runoff into these features.
- Consider use of impervious area disconnection (simple disconnection) to direct runoff to adjacent vegetated areas if there is sufficient land area on the site.
- Where surface area is limited, use underground infiltration systems and underground detention below parking lots.
- Use permeable pavement for parking stalls, parking aisles, and overflow parking.
- Provide compact car spaces, minimize parking stall dimensions, and incorporating efficient parking aisles such as diagonal parking spaces with one-way aisles.
- Consider shared parking agreements with adjacent or nearby properties.
- Consider use of structured parking.
- Pretreatment is required for runoff from parking lots prior to entering a structural stormwater BMP (see [Chapter 13 - Structural Stormwater BMP Design Guidance](#)) or prior to discharge to adjacent vegetated areas through the use of impervious area disconnection (simple disconnection).
- Infiltration of stormwater from industrial and commercial facilities is restricted for certain Land Uses with Higher Potential Pollutant Loads (LUHPPLs) (see [Chapter 10 - General](#)

[Design Guidance for Stormwater Infiltration Systems](#)), in locations where contaminated soils exist, where the required vertical separation to SHGT cannot be met, or in locations with unacceptable horizontal setbacks for infiltration.

### Roofs

- Direct roof downspouts to pervious vegetated areas (simple disconnection), dry wells or other infiltration systems, or to cisterns for non-potable reuse such as lawn or landscape irrigation.
- Consider use of green roofs to manage runoff from building roof areas.

### Lawn and Landscaped Areas

- Use low-maintenance LID landscaping techniques to minimize lawn area and maintenance needs (e.g., irrigation, fertilizers, and pesticides).
- Use diverse selection of native vegetation species.
- Incorporate trees in bioretention systems within parking lot islands and around the perimeter of parking lots to provide shade and cooling of impervious surfaces and stormwater runoff during the summer.
- Maintain pre-development flow path lengths in natural drainage patterns.