Action Plan 3: Promoting Low Impact Development

Problem

Most development projects are designed and built using conventional development approaches, subdivision layouts and structural practices that encourage sprawl by maximizing road widths, parking areas and other impervious areas, and involve indiscriminate clearing and grading. The increase in impervious cover combined with soil compaction and removal of protective vegetation causes stormwater runoff to accelerate over land rather than infiltrate into the ground. The result is reduced groundwater recharge, increased flooding, increased downstream erosion and other negative impacts on water resources, wetlands, and habitat.

Although a significant portion of the Buzzards Bay watershed remains undeveloped, historically developed areas, including the industrial and port areas of New Bedford, Fairhaven, and Acushnet, and residential areas such as Wareham and Bourne, tend to reflect older zoning and development practices. Less densely developed or undeveloped areas of the Buzzards Bay watershed tend to be located further from coastal areas. Southeastern Massachusetts is favorably viewed as being within commuting distance of Boston and Providence, creating the need for new housing and businesses. Redevelopment in attractive coastal areas is continuing, along with new development inland of the coast. One of the largest tracts of undeveloped land remaining in southeastern Massachusetts, comprising several thousand of primarily forests and cranberries, is currently being planned for development.

This ongoing development of land in the Buzzards Bay watershed brings potential changes to the hydrological characteristics and water quality threats in the watershed. Cumulatively, these projects can add up to significant impacts to receiving waters including reduction of groundwater recharge and increased pollution such as nutrients and bacteria.

Background

Low-impact development (LID) offers an alternative approach in land development, an opportunity to develop land in a way that results in low impacts, and in some aspects, positive impacts. LID involves careful site planning and parcel level management strategies, including site design and stormwater design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of origin. This strategy helps to achieve the goals of mimicking a site's pre-development hydrology, protecting native vegetation, maintaining natural water budgets capable of sustaining sensitive water resources, and keeping pollutants out of the stormwater stream before they can negatively impact downstream water resources.

As discussed by the Puget Sound Action Team (www.psat.wa.gov), LID is based on the premise that nature knows how to manage water and stormwater runoff best. Forests and other natural land covers are extremely effective in recharging groundwater. In these areas, most of the rainfall infiltrates into the ground, is absorbed by vegetation, or evaporates to the atmosphere with very little stormwater runoff generated. Development activities that clear forests and other natural areas and replace them with impervious surfaces and stormdrain pipes alter the natural hydrology. These "hard" surfaces no longer allow rainfall to soak into the ground, resulting in an increase in surface runoff.

To counteract the effects of conventional development, stormwater storage facilities are often used to reduce flooding and treat stormwater-related pollution. These structures, however, are often maintenance intensive, unsightly and costly to install. Rather than collecting and conveying stormwater runoff through storm drain pipes or other conveyances to a centralized stormwater facility, LID-minimizes the use of impervious surfaces and incorporates natural vegetation and small-scale treatment systems to treat and infiltrate stormwater runoff. This involves strategic placement of linked lot-level controls that address specific pollutants and stormwater timing, flow rate, and volume issues.

Low impact development is defined by the Commonwealth's Executive Office of Environmental Affairs Smart Growth Toolkit as "an approach to environmentally friendly land use planning. It includes a suite of landscaping and design techniques that attempt to maintain the natural, pre-developed ability of a site to manage rainfall. LID techniques capture water onsite, filter it through vegetation, and let it soak into the ground where it can recharge the local water table rather than being lost as surface runoff. An important LID principle includes the idea that stormwater is not merely a waste product to be disposed of, but rather than rainwater is a resource."

Site planning using the LID approach starts with identifying critical environmental resource areas on, adjacent to and downgradient of the site. Such resource areas can include drinking water protection areas, sensitive wildlife habitats, and buffers to wetlands, streams and estuaries. House sites and roads are then planned out providing the maximum buffers to these resource areas. The site design reflects the site's natural runoff patterns, soil types, sensitive areas, and other key features and relies on those features to dictate the develop-

ment pattern, rather than forcing a pre-conceived design upon an unwilling landscape. Refer to Action Plan 4: Improving Land Management and Smart Growth for more detailed discussion of site planning and design tools.

In LID developments, buildings are often clustered to protect natural areas by preserving open space. LID designs incorporate narrower roads and use permeable pavement for parking lots, driveways, and other impervious surfaces. Runoff from remaining impervious surfaces, such as rooftops, can be directed onto vegetated areas with porous soils. Roof gardens use soil and plants to absorb and evaporate water and slow runoff. Rooftop runoff can also be collected and re used. The proximity of the development to other developed areas (including village centers) can provide reduced costs associated with shared (neighborhood) wastewater treatment systems.

Some of the key goals of LID are as follows:

- Integrate stormwater management early in site planning activities;
- Mimic natural hydrologic functions;
- Focus on prevention rather than mitigation;
- Emphasize simple, nonstructural, low-technology, and low cost methods;
- Manage stormwater as close to the source as possible;
- Distribute small-scale practices throughout the landscape;
- Rely on natural features and processes; and
- Create a multifunctional landscape.

The minimization of impervious areas is a key LID feature and directly ties into the protective goals of maintaining natural site hydrology, allowing for adequate groundwater recharge, and reducing pollution and erosion from stormwater runoff. Other common LID techniques include:

- Green Rooftops that store and transpirate precipitation before it can leave the rooftop surface;
- Raingardens, rain barrels, cisterns, and other rainwater storage technologies that capture and store runoff for later use immediately after the runoff has exited roofs, driveways, or other impervious areas;
- Bioretention areas, constructed wetlands, and vegetated swales that transport, capture, store, infiltrate, and treat larger volumes of runoff while reducing the reliance on maintenance-intensive hard structures for stormwater management; and
- Better parking lot design, which divides large expanses of pavement into smaller sections where runoff can be managed and infiltrated in smaller quantities.

An integration of LID principles and management practices allows for stormwater to be delayed (increased time of concentration) and infiltrated onsite, thereby reducing runoff volume and downstream flood damage (peak runoff control), and improving downstream water quality. The infiltration of stormwater provided by LID practices can result in more groundwater recharge than may have occurred under pre-development conditions, which in turn can help offset increasing water supply demand from other locations in the watershed. Finally, the hydrologic benefits of LID are also accompanied by an aesthetically pleasing landscape and neighborhood layout that manages stormwater more economically and with lower maintenance requirements than is generally the case with traditional stormwater management practices.

Major Issues

As the Buzzards Bay watershed becomes increasingly developed, environmental impacts will also increase unless proactive measures are undertaken now. Conventional development may offer quick profits because the methods are well known and have been widely utilized; however, conventional development may not be the best way to protect sensitive resources. LID represents a sustainable approach to development that minimizes or eliminates impacts of development on water resources and habitat associated with Buzzards Bay. The key challenge is to encourage developers, planners, engineers and the public to utilize LID and other smart growth development approaches as the preferred alternative to conventional development.

A significant obstacle to the acceptance of LID principles is the perception that conventional development may be less expensive than LID and other methods of sustainable development. According to the Natural Resources Defense Council (www.nrdc.org/water), LID can often cost less than conventional stormwater management systems from both an installation and maintenance standpoint. LID design allows for less road surface and encourages less underground storm drain infrastructure (pipes, catch basins, manholes). In addition, the associated vegetation also offers human quality of life benefits by greening the neighborhood, contributing to livability and aesthetics. This “greening” can enhance property values and marketability, and provide wildlife habitat along with pollution reduction and decreased flooding. Instituting change throughout the planning and development community will require showing that conventional development will cost Buzzards Bay communities more, in terms of environmental degradation and quality of life impacts, than the cost of changing over to sustainable development approaches.

Action Plan:
Promoting Low Impact Development

Goal

1. To encourage low-impact development (LID) and redevelopment that minimizes and/or eliminates environmental impacts.

Objectives

1. Promote incentives to developers and project proponents to incorporate LID into project site designs.

2. Provide training to local and state regulatory officials and developers/designers on LID.

3. Adopt and implement LID bylaws regulations, and policies at the local and state governmental level.

CCMP Recommendations and Commitments

<u>*Buzzards Bay National Estuary Program*</u>

3.1 The Buzzards Bay NEP should promote adoption of LID Bylaws and unified regulations.
Priority: High
Responsible Agent(s): BBNEP for training, NGOs raise support for passage of bylaws
Commitments:
Legislation required: None
Estimated costs: Costs of providing training will vary, but could range between $5K to $20K depending on workshop length, speakers fees and expenses, rental fees for facility, etc.
Potential funding: EOEA Smart Growth grants and CZM CPR and NPS grants.
Schedule:
Implementation strategy: The BBNEP should work with Buzzards Bay municipalities to assist with the adoption and implementation of the LID Bylaws and unified stormwater regulations among town boards. They should also provide training in the review of plans and stormwater calculations for compliance with local regulations, and to identify when professional engineering reviews are required.
Measuring success: BBNEP provide training opportunities to the target audience. Effective outreach is provided to a wide audience, including the intended target audience. There is widespread understanding of the problems with conventional development and the need for LID. There is increasing or widespread support for using the recommended measures. There is widespread use of LID measures. At least half the Buzzards Bay communities have participated in workshops and formally considered whether LID bylaws are appropriate in their town.

3.2 The BBNEP should develop a comparison of the costs and impacts of conventional development vs. LID and smart growth development, and provide this information to the municipalities.
Priority: Medium
Responsible Agent(s): The BBNEP in cooperation with MCZM/EOEA
Commitments: The BBNEP is committed to this task.
Legislation required: None
Estimated costs: Estimated $20K
Potential funding:
Schedule: Study drafted by December 2007, ongoing data collection continues beyond 2007.
Implementation strategy: CZM/EOEA will provide information to BBNEP on relevant case studies with cost data.
Measuring success: The analysis results in information that is useful for decision-making and management and the information is used for decision-making and management.
Comments: Case studies that compare similar sites, where one site was developed using conventional methods and another site was developed using LID, should be developed to help illustrate the benefits of LID. Examples most likely already exist in the watershed. The evaluation of costs should include a comparison of the short-term development costs and the costs of long-term environmental remediation needed to address impacts (e.g., costs of funding stormwater BMP retrofits to remediate existing untreated stormwater discharges).

3.3 The BBNEP should develop an inventory of pilot LID implementation projects and provide a guidance document and map that identifies the location, site information, costs, benefits and specific data relative to the project.
Priority: Medium
Responsible Agent(s): The BBNEP
Commitments: The BBNEP has committed to his task.
Legislation required: None
Estimated costs: Estimated $20K
Potential funding:
Schedule: Commence inventory in 2007, ongoing data collection continues beyond 2007.
Implementation strategy: CZM/EOEA will provide information to BBNEP on relevant case studies with site data.
Measuring success: A completed inventory and map identifying LID implementation projects in southeastern Massachusetts.

<u>*Federal*</u>

3.4 The US EPA should promote LID through funding and partnership building, as part of nation-wide Smart Growth initiatives.
Priority: Medium
Responsible Agent(s): U.S. EPA Region 1
Commitments:
Legislation required: None for funding. Change in NPDES Phase II permit required for next 5-year cycle, to begin in 2008.
Estimated costs: unknown
Potential funding:
Schedule:
Implementation strategy:
Measuring success: EPA provides funding for training and implementation of LID techniques as part of Smart Growth initiatives. EPA funds pilot implementation projects and produces guidance to municipalities on how LID can meet Phase II requirements.
Comments: Stormwater management is a key goal of the recent Phase II NPDES program and Clean Water Act provisions, which are implemented by the U.S. EPA. The use of LID as a component of stormwater management therefore should be promoted by EPA, through funding for training and outreach programs, developing and distributing outreach materi-

als, and encouraging local-regional-state-federal partnerships to manage stormwater, and during EIS/EA reviews. Funding may be to state and/or regional agencies, such as EOEA, MA CZM, SERPDD, CCC, Massachusetts Highway Department, US EPA headquarters, and others. In addition, EPA should incorporate LID implementation among the requirements of the next 5-year cycle of the Phase II NPDES permit program.

3.5 NRCS should work with EPA to incorporate LID hydrology into the TR-55 model used by engineers and regulators.

Priority: High
Responsible Agent(s): NRCS, EPA
Commitments:
Legislation required: None
Estimated costs: Unknown
Potential funding: NRCS budget
Schedule: Initiate development of revised TR-55 model, or alternative, by July 2007. Publish revised model by December 31, 2008.
Implementation strategy: NRCS should work with EPA to identify hydrologic methods and a core set of LID BMPS that should be incorporated into the TR-55 model, or an alternative model. NRCS can then develop the revised model using existing peer-reviewed data and design characteristics. Training and outreach by NRCS, EPA, and local state agencies and LID experts will then be needed to teach engineers and reviewers how to use this model.
Measuring success: A model is published by NRCS and engineers begin using the model regularly to incorporate LID design into site development by the end of 2008.
Comments: Development of this model should be undertaken with assistance from engineering associations and research institutes to ensure proper understanding of the design and function of the LID BMPs, and to define the set of user-specified variables that will be needed in the model for LID BMPs. Training and outreach will be needed in order to teach practitioners how to use this software.

Commonwealth of Massachusetts

3.6 EOEA should showcase LID through a series of demonstration projects.

Priority: Medium
Responsible Agent(s): EOEA and MCZM
Commitments:
Legislation required: None
Estimated costs: $30,000 per demonstration project
Potential funding: Smart Growth Technical Assistance Grants, EPA/MA DEP 319 Grants, CZM CRP/NPS Grants
Schedule: Beginning in 2007 and ongoing
Implementation strategy: Identify interested parties and discuss possible projects. Develop proposal. Identify and obtain funding. Develop design and final plans. Construct LID development. EPA and EOEA should consider an award program for implementation of LID projects that may provide incentives to developers and/or institutions to implement LID projects.
Measuring success: LID demonstration project is successfully funded, built, and documented and provides an example for others to follow.
Comments: LID demonstration projects should be undertaken to provide an example to developers, agencies and the public. Existing examples of LID principles should be showcased. Demonstration projects can be undertaken by a partnership involving private and public sectors, the BBNEP, NGOs, educational institutions, or combinations thereof. Partnership-building is needed. EOEA has undertaken similar efforts recently.

3.7 MEPA should require the submission of an LID alternatives analysis for commercial and residential projects that meet MEPA thresholds (for land, rare species, wetlands, water, wastewater, transportation and ACEC) for EIRs.

Priority: High
Responsible Agent(s): EOEA MEPA Office,
Commitments:
Legislation required: Change in MEPA regulations required.
Estimated costs: Unknown
Potential funding:
Schedule: Change implemented by Dec 2007.
Implementation strategy: MEPA Office and EOEA should have a Task Force to develop recommendations for requirements of an LID Alternatives Analysis and present that to EOEA Secretary and MEPA Director for consideration. The MEPA Office should add changes to their website that promotes LID as part of a pre-project planning process, and MEPA should distribute appropriate guidance materials that encouraging LID strategies prior to project submissions.
Measuring success: Projects filing EIRs under MEPA begin to include LID alternatives analyses in the filing, and begin to select LID design as the preferred alternative.

3.8 EOEA should keep its LID Model Bylaw and Smart Growth Toolkit up-to-date.

Priority: High
Responsible Agent(s): EOEA should continue to provide training workshops to promote LID and other Smart Growth techniques, and keep the Toolkit up to date. The BBNEP and BBAC should continue to facilitate training workshops in LID. Municipalities should provide support for staff and board to attend training. The target audience for LID should include municipal staff and boards involved in policy and permitting of development (e.g., Planning Boards, Building Inspectors, Conservation Commissions, Zoning Boards, Boards of Health, and others), developers, builders, engineering firms, homeowners associations, trade associations, and the public.
Commitments:
Legislation required: None
Estimated costs: Cost of providing training workshops, outreach materials, and updating the Toolkit and LID Model By law, as necessary.
Potential funding: EOEA.
Schedule: Beginning in FY 2007 and ongoing.
Implementation strategy:
Measuring success: EOEA continues to provide training opportunities to the target audience. Effective outreach is provided to a wide audience, including the intended target audience. There is widespread understanding of the problems with conventional development and the need for LID. There is increasing or widespread support for using the recommended measures. There is wide-spread use of LID measures. There is noticeable improvement in water quality and habitat, or at least no further degradation.
Comments: has published the Smart Growth Toolkit that provides guidance on LID, including an LID Model Bylaw. This toolkit must be kept up to date and outreach should be provided to local governments and the development community.

3.9. MA CZM should continue to sponsor the LID Working Group that meets monthly and provides education and outreach to a wide range of participants.

Priority: High
Responsible Agent(s): MA CZM
Commitments:
Legislation required: None
Estimated costs: $100,000
Potential funding: EOEA
Schedule: Meets monthly and shares information through email network
Implementation strategy: This group should continue to meet, compile useful LID information and case studies and continue to conduct workshops.
Measuring success: MA CZM plan for and provide training opportunities to the target audience. Effective outreach is provided to a wide audience, including the intended target audience. There is widespread understanding of the problems with conventional development and the need for LID. There is increasing or widespread support for using the recommended measures. There is widespread use of LID measures. There is noticeable improvement in water quality and habitat, or at least no further degradation.

3.10. DEP, with EOEA and MCZM guidance, should complete the update of MA Stormwater Standards and Policy.

Priority: High
Responsible Agent(s): MA DEP is responsible for updating the Stormwater Standards and Policy. Other agencies and organizations that should encourage incorporation of LID and completion of the Standards and Policy include the BBNEP, BBAC, municipal Planning Boards and Conservation Commissions, and the Coalition for Buzzards Bay. Local bylaws among town boards should be consistent as illustrated in the Buzzards Bay NEP "Unified Stormwater Regulations" for municipalities.
Commitments:
Legislation required: None
Estimated costs: Unknown
Potential funding:
Schedule: Beginning in the fall of 2006 with annual updates, as necessary.
Implementation strategy: Advisory Committee meets regularly to advise DEP and make recommendations.
Measuring success: The revised Stormwater Standards and Policy incorporating LID techniques is published and becomes effective. There is widespread use of LID techniques and wide understanding of its important role in watershed protection. Impaired water bodies and habitat improve or at least do not degrade further.
Comments: MA DEP is currently updating their Stormwater Standards and Policy. One of the recommendations from the Advisory Committee is to incorporate and encourage LID. MA DEP should look to promote and, if possible, require LID development throughout the Commonwealth. Higher standards for LID should be promoted in sensitive coastal areas such as the Buzzards Bay watershed and in "stressed basins" identified by DCR.

3.11 State Board of Building regulations should revise the State Building Codes to require LID measures.

Priority: Low
Responsible Agent(s): State Board of Building Regulations and Standards
Commitments:
Legislation required: Revision of State Building Code at 780 CMR.
Estimated costs:
Potential funding:
Schedule: Adoption of LID within the State Building Code by 2009.
Implementation strategy: The State Building Code at 780 CMR should be revised to allow or require the use of LID measures where feasible, just as requirements for energy conservation measures were incorporated in the late 1990's.
Measuring success: Revised building code incorporating LID is adopted and implemented locally. Implementation of LID measures is universal and consistent, and results in minimal or reduced impacts on the watershed and on Buzzards Bay.
Comments: The State Board of Building Regulations and Standards is the agency that promulgates building code changes according to a public process. Implementation of State Building Codes is carried out by local Building Commissioners in each municipality.

Regional Planning Agencies

3.12 SRPEDD and CCC should continue to provide LID training and outreach and education to municipalities and developers. CCC should incorporate LID into their Regional Policy Plan and apply these standards to projects under their regulatory review.

Priority: High
Responsible Agent(s): SRPEDD and CCC are to incorporate LID in their outreach and planning. Municipalities should adopt LID bylaws, measures and policies. Developers and building associations should attend LID workshops and promote its use, including providing opportunities for demonstration projects.
Commitments:
Legislation required: Promoting LID through outreach will not require legislation. However, SRPEDD and CCC can promote the adoption of Model LID Bylaws in municipalities. Municipalities should adopt and implement LID bylaws.
Estimated costs:
Potential funding:
Schedule: Ongoing. LID incorporated in CCC Regional Policy Plan by July 2008.
Implementation strategy:
Measuring success: LID standards and approaches are incorporated into regional planning guidance and requirements. Municipalities adopt and implement LID bylaws. LID is used widely by developers. There is improvement or at least no further degradation of water quality and habitat in the Buzzards Bay watershed and the Bay itself.

Municipalities

3.13 Each Buzzards Bay community should adopt an LID Bylaw and revise Planning Board, Conservation Commission and other applicable board regulations to reflect the new code.

Priority: High
Responsible Agent(s): All Buzzards Bay municipalities (Planning Boards, Conservation Commissions, Building Departments).
Commitments:
Legislation required: Requires municipal approval of the LID Bylaw (town meeting) or regulations (individual boards, where applicable).
Estimated costs: Costs could include labor to modify and tai-

lor the existing LID Model Bylaw to suit a particular municipality.
Potential funding: Under M.G.L. Ch. 83, S. 16 ("Charge for use of sewers"), municipalities may create a stormwater management utility to raise fees to manage stormwater facilities that serve multiple residents and/or commercial properties. Such a stormwater utility is analogous to a sewer utility, and may include LID measures. A "water pollution abatement" district needs to be defined first, under M.G.L. Ch. 40, S. 1A.
Other funding sources include EOEA Smart Growth Technical Assistance Grants and CZM CRP and NPS Grants.
Schedule: Beginning in 2007 and ongoing.
Implementation strategy: Combine efforts with TMDL requirements and Phase II permits (refer to Action Plan 2: Managing Stormwater Runoff). Municipalities can utilize the Buzzards Bay NEP Unified Regulations for Town Boards but need to modify it for local application.
Measuring success: LID bylaws are adopted and implemented by municipalities within the watershed. Water quality and habitat within the watershed do not degrade further, and degraded environments may improve.
comments: The LID Bylaws should contain provisions for the treatment and infiltration of stormwater runoff and an incentive (credit) system to encourage developers to minimize impacts by reducing impervious areas, disconnecting rooftops and driveways from street drainage and maintaining naturally vegetated buffers to wetlands, streams and marine waters.

3.14 Local government staff and municipalities board members should attending LID training meetings and workshops to learn about sustainable development practices

Priority: High
Responsible Agent(s): DPW personnel, Town Planners, Planning Board members, Zoning Board of Appeals members, Selectmen, Building Inspectors, Conservation Agents, Conservation Commissions, and other municipal staff and boards dealing with permitting development and redevelopment. To provide training: Buzzards Bay NEP, MA CZM, regional planning agencies, building associations.
Commitments:
Legislation required: None.
Estimated costs: $5,000 per town per year
Potential funding: Selectmen and mayors should provide general funds, or use development permit fee. Alternative funding may include EOEA Smart Growth Technical Assistance Grants
Schedule: Beginning in 2007 and ongoing.
Implementation strategy: Key state and local staff and municipalities boards should become familiar with LID and other sustainable development practices, and attend training workshops where applicable. including DPW personnel, Town Planners, Planning Board members, Zoning Board of Appeals members, Selectmen, Building Inspectors, Conservation Agents, Conservation Commissions, and others to become trained and familiar with LID and other sustainable development practices.
Measuring success: Agencies provide training opportunities to the target audience. Effective outreach is provided to a wide audience, including the intended target audience. There is widespread understanding of the problems with conventional development and the need for LID. There is increasing or widespread support for using the recommended measures. There is widespread use of LID measures. There is noticeable improvement in water quality and habitat, or at least no further degradation.
Comments:

Non-Governmental Organizations (NGOs)

3.15. The development industry should promote the adoption of LID Bylaws.

Priority: Medium
Responsible Agent(s): The Cape Cod Homebuilders Association, Massachusetts Homebuilders Association, Massachusetts Association of Municipal Employees, American Planning Association, and other development and planning organizations should provide LID training to their members. EOEA, MCZM, BBNEP, and the BBAC should provide "Train-the-trainer" workshops to ensure the that the industry can provide LID training to their members
Commitments:
Legislation required: None
Estimated costs: Cost of providing train-the-trainer and other workshops could vary between $5K to $20K depending on workshop length, complexity, invited speakers, etc.
Potential funding: NAHB, EOEA, EPA
Schedule: Beginning in the spring of 2007 and ongoing.
Implementation strategy:
Measuring success: Industry provides training opportunities to the target audience. Effective outreach is provided to a wide audience, including the intended target audience. There is widespread understanding of the problems with conventional development and the need for LID. There is increasing or widespread support for using the recommended measures. There is widespread use of LID measures. There is noticeable improvement in water quality and habitat, or at least no further degradation.
Comments: "Train-the-trainer" workshops should be provided to these organizations and their members on the benefits of LID, and the construction specifications and sequencing to construct LID BMPs.