Technical Memorandum 3: Rationale for Selection of Alternative Scenarios for Implementation

Partners for the Connecticut Low Impact Development and Stormwater General Permit Evaluation

Connecticut

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1 Background and Purpose

1.1 Background

The Connecticut Department of Environmental Protection (DEP) has initiated a project to explore inclusion of low impact development (LID) into its four stormwater general permits (SGPs)—construction, municipal separate storm sewer systems (MS4s), industrial, and commercial—as well as the *Soil Erosion and Sediment Control Guideline* and the *Stormwater Quality Manual*.

Under Technical Memorandum 1[1] information was gathered from:

- Research on state stormwater general permit programs.
- Interviews conducted with project Partners.

This work was further supported by two workshops held on May 26, 2010 and July 1, 2010 and resulted in the identification of several alternatives for implementation, which were initially discussed in Technical Memorandum 1.

1.2 Purpose

This report, Technical Memorandum 3, builds on the alternatives described in Technical Memorandum 1 and additionally discusses:

- How the alternatives can be most effectively incorporated into the DEP's SGPs.
- Mechanisms for incorporating LID into the SGPs for priority attention such as giving LID priority over end-of pipe BMPs.
- A decision making approach for selecting scenarios for full development. This was subsequently used to provide a rationale for selection during Workshop 3.

Workshop 3 included a review of the alternative scenarios. It also provided the Partners an opportunity to discuss the alternatives, adjust the alternatives to better meet the criteria, and select alternatives for full development. Following Workshop 4, the final project report will expand on Technical Memorandum 3 in order to addresses:

- Inclusion of LID in the industrial, commercial and MS4 general permits.
- A method for measuring the success of the project relating to improved permit compliance or environmental benefits.

[1] Technical Memorandum 1 is a compilation of Summary 1 and Summary 2.

2 Summary of Alternatives

2.1 Methods Used to Incorporate LID and Pollution Prevention

The following subsections discuss alternatives that could be used to incorporate low impact development and pollution prevention into Connecticut's stormwater general permits. These alternatives are based on the information gathered during research on state programs, Partner interviews, and activities conducted during workshops 1 and 2.

2.1.1 Regulatory Alternatives

The approaches described below involve changes to regulatory policy. Prior to the start of this project DEP identified two regulatory alternatives for implementation. These two alternatives are:

- Incorporating LID through updates to the *Stormwater Quality Manual* and *Soil Erosion and Sediment Control Guidelines*.
- Establishing standards in the Stormwater General Permit.

Sections 2.1.1.1 and *2.1.1.2* present options for incorporating LID policy and standards into the manual, guideline, and SGP. Although these alternatives have been identified for implementation by DEP, DEP would like the form of the implementation to be determined by the project Partners.

Other regulatory alternatives presented are optional and may be included, discarded, or adjusted as determined by the Partners.

2.1.1.1 Incorporating LID through Updates to the Stormwater Quality Manual and Soil and Erosion Guidelines

As part of this project, DEP intends to incorporate LID updates made to the *Stormwater Quality Manual* and the *Soil Erosion and Sediment Control Guidelines* into the SGP. Initially, this will be as a write-up under Summary 5 and Technical Memorandum 4. Generally speaking, the write-up will address the following topics:

- Advantages of managing stormwater using LID.
- Four basic tenets of LID.
    - Examples of BMPs for Minimizing Site Disturbance.
    - Working with Site Hydrology.
    - Examples of BMPs for Minimizing and Disconnecting Impervious Surface.
    - Applying Small-Scale BMPs at the Source.

Through workshops, interviews, and general discussion, the Partners have already identified a number of features of good LID policy and implementation that could be included in the update. Some examples include:

- LID and pollution prevention performance standards.
- Standards for runoff management.
- Groundwater recharge standard.
- A design process for LID.
- Maintenance requirements.
- Soil based standards.
- Process for innovation.

The write-up of the standards could take one of three forms:

- Standalone document that focuses on the LID process and LID standards.
- Appendix to the existing *Stormwater Quality Manual* and *Soil Erosion and Sediment Control Guideline*.
- Full update to the *Stormwater Quality Manual* and *Soil Erosion and Sediment Control Guideline*.

Partners will be offered an opportunity to make a preliminary decision on the form of the write-up during Workshop 3. This preliminary decision will help to inform Summary 5, which will focus on LID standards. Workshop 4 will be used to solidify the preliminary decision.

In general, the advantage of a standalone document or an appendix is that either can be developed fairly quickly and with a pure focus on LID. Updates of both the manual and guidelines will necessitate a more involved process of fitting LID into the structure of the existing documents. This will take substantially longer.

2.1.1.2 Establishing Standards in the Stormwater General Permits

Prior to the start of this project, DEP had determined that the *Stormwater Quality Manual* and *Soil Erosion and Sediment Control Guidelines* should be updated to include LID and that the manual and guidelines or LID standards established in the manual and guidelines should be incorporated into the SGP. Three basic approaches have been identified to accomplish this:

- Reference Manual/Guidelines as a Requirement in the Stormwater General Permits

  One fairly straightforward way to incorporate LID into Connecticut's SGP is to update the manual and guidelines with LID standards and design processes; and then reference the manual and guidelines in the SGP as a required standard. This approach simplifies regulatory policy by separating it from the relatively lengthy description of the LID design process that is needed to provide appropriate theory and flexibility. This approach also provides a relatively clear and certain standard. However, requiring the use of a specific process may constrain designers and regulators as it limits the process of innovation and professional judgment in atypical circumstances. (The policy of no

other state, which was reviewed for Technical Memorandum 1, makes an outright requirement to strictly follow a specific manual or design process.)

To compensate for this apparent shortcoming, the manual and guidelines could be written to include both a relatively strict design process as well as a process for innovation that relies on conservative performance standards. The choice of the "strict" or "innovative" process could be dictated by the permittee or, in applicable circumstances, special site conditions (e.g., presence of approved total maximum daily loads).

- Reference Manual/Guidelines as Guidance in the Stormwater General Permit

  As an alternative to a strict requirement in the SGP to use the *Stormwater Quality Manual* and *Soil Erosion and Sediment Control Guidelines*, DEP could reference the manual and guidelines as guidance documents for permitting purposes. This approach is used by a number of states around the country as discussed in Technical Memorandum 1 (see *Section 2.4*). This approach has the advantage of allowing for some flexibility in application of standard; however, it also creates some uncertainty and indirectly creates the question—if the manual and guidelines are not required, what is the requirement?

- Write Specific Standards from the Manual/Guidelines into the Stormwater General Permit

  One way to incorporate LID into state policy without citing the *Stormwater Quality Manual* or *Soil Erosion and Sediment Control Guidelines* is to codify the standard in the SGP. However, because LID essentially employs a *process*, the LID approach is not readily translated into discrete design standards. That said, the designed treatment capacity of LID integrated management practices[2] (IMPs) can be quantified and used as a measure of treatment effectiveness. Research on approaches used by other states revealed two approaches that could be adapted for use in Connecticut.

  Establish a Water Quality Volume (WQV) Standard – Most states use WQV as a method to measure stormwater treatment effectiveness. States that have incorporated LID typically link treatment provided by LID to WQV either directly or indirectly (e.g., through a "credit" system).

  A common method used by other states to demonstrate incorporation of LID is to require that a fraction or percentage of the WQV is managed with LID. For example, the San Francisco Regional Water Quality Control Board (RWQCB) has developed a municipal regional stormwater Permit / Order that mandates water quality goals to be "accomplished primarily through the implementation of low impact development (LID) techniques." The permit specifies that LID must be used for 100% of the water quality

[2] LID uses the term integrated management practice to refer to small-scale, structural BMPs installed at multiple locations throughout a site. The term IMP is comes from the idea that the management practices are "integrated" into natural hydrologic low points of the landscape. Application of IMPs is one of four tenets of LID. IMPs are generally employed to support stormwater treatment after the available capacity of other LID approaches (e.g., disconnection, minimizing site disturbance, etc.) is exhausted.

volume treatment. Connecticut could establish a LID-incorporation standard, which could be set between 1 – 100%. Setting of the standard could be based on a variety of factors such economics, site-specific environmental concerns, general ability of the regulated community to implement, etc.

Set-Aside for LID – Wisconsin has established a set-aside requirement for infiltration. Under this approach 1 - 2% of any land included in a development project must be reserved for infiltration practices. Connecticut could develop a similar approach for LID with adjustment for local soils.

Partners will be offered an opportunity to make a preliminary decision on the form of the standard in the SGP during Workshop 3. Later workshops will be used to solidify this decision.

2.1.1.3 Designer Licensing

Designer licensing refers to a process that extends certain privileges to designers who maintain good standing under a licensing program. In Rhode Island, the Department of Environmental Management has developed a designer licensing program for septic system designers and installers. The program allows these professionals to use an abbreviated permitting review process provided that they attend classes, pass a test, and maintain a certain quality of work as determined by spot review of application materials.

Connecticut could establish a LID designer licensing or certification process for design professionals and developers. Under this approach, specific standards would be set and designers would be trusted to meet the standards without regulatory review. To ensure that the designers stay current, the certification could include a requirement for periodic renewal (e.g., every five years). Training could be offered through an institute of higher learning such as the University of Connecticut. Essentially, a continuing education process such as this would allow stormwater program managers to ensure the appropriateness of information provided to developers using LID in Connecticut. Such a program could be incentivized by allowing certified/licensed designers to submit designs under a GP that provides extra flexibility and limits regulatory oversight. Behavior change (i.e., the appropriate use of LID in designs) could be measured before and after the implementation of the training program through spot review of permit applications.

Designer licensing was not specifically suggested during workshops or by Partners, but is an approach that would maintain high design standards, allow for application of a flexible permitting process, while reducing time required for the permitting process. Design licensing could also reduce the administrative burden on regulators and allow them to redirect their energies.

2.1.1.4 Impervious Cover Cap and Trade

Impervious cover cap and trade was suggested during the carousel activity of Workshop 2. Based on our research it has not been implemented in other Phase 2 Stormwater jurisdictions (e.g., other states); however, a similar approach is used to govern air emissions. To implement the approach, Connecticut could place a cap on the amount of impervious cover allowed in a

regulated area or industrial sector and apportion units of impervious surface to entities (i.e., land owners) within the area or sector. The state could set a unit value (e.g., $50,000 an impervious acre) or allow the market to self-set a unit value through trading. Trading could be allowed between entities with oversight provided by the state. Adding to the approach, the state could allow applicants to "purchase" additional units of impervious cover based on the market value with proceeds deposited in a remediation bank. An official trading certificate could be used to demonstrate number of units used or traded as part of a development permit.

Two important considerations related to cap-and-trade programs include:

- Collecting fees to build projects off site commonly requires local or state government to provide staff for planning, design, property acquisition and construction of retrofit and restoration projects.
- Developing a fee schedule that reflects environmental costs and benefits in a dynamic market may be impracticable. Developers and regulators may confront situations where cap-and-trade fees undercut the cost of appropriate management practice. In such cases, the cost of environmental protection may be unduly externalized to government or the general public and subvert the intent of the approach.

2.1.1.5 Adjusted Standards for Areas or Circumstances of Special Concern

A number of states include flexibility in their stormwater management standards to address atypical circumstances. In some cases, adjusted standards are intended to be more highly protective of sensitive resources. In other cases, the standards are relaxed to encourage infill development or to reduce the burden of stormwater management in areas where it yields diminishing return. Some examples of adjusted management standards include:

- Standards designed to achieve pollutant load reductions for impaired water resources.
- Nitrogen management requirements for nitrogen-sensitive resources such as Long Island Sound or drinking water aquifers.
- Relaxed impervious cover allowances in highly urbanized settings.
- Graduated recharge requirements based on hydrologic soil group.

2.1.2 Nonregulatory Alternatives

The following section discusses nonregulatory approaches, which could be used to help implement LID policy. These approaches could be used as a standalone approach to implementation or could be used in conjunction with other initiatives such as regulatory approaches.

2.1.2.1 Training Program

A training program could be voluntary or mandatory and, therefore, could be considered as either a regulatory or nonregulatory approach. This report discusses implementation of training programs through both regulatory (i.e., designer licensing, see *Section 2.1.2.4*) and nonregulatory approaches.

Training, education, and behavior change were raised as important aspects of implementation during both the Partner interviews and workshop activities. Training could be provided on an *ad hoc* basis through occasional workshops and conferences. Training could also be structured into a series of classes, curriculum, certification, or licensure with a continuing education requirement. Target audiences for training and education might include homeowners, municipal officials, designers, contractors or other members of the regulated community. A grant or other financial allocation could be used to develop a training program or educational series. Training program development may best be run through a college or university as such institutions already possess many of the resources needed to implement and assess the cost-benefit of a training program.

2.1.2.2 Financial Incentives

During the Partner interviews as well as workshops 1 and 2, several participants specifically identified incentives, funding and other support for the regulated community as important elements of implementation of LID policy. Previously, Connecticut has offered some grants for LID projects (e.g., Farmington River Enhancement Grant Municipal Land Use Evaluation Project for Village Center and Low Impact Development Guidelines and Regulations). Connecticut could structure LID grants to create a pilot program for statewide LID implementation. Additional incentives for LID implementation at the local level could include technical assistance, delegation of authority from state to local programs, and reduced regulatory oversight at the state level for effective local programs.

2.1.2.3 Technical Assistance

Program implementation tends to be more effective when technical assistance is offered by oversight agencies to implementing agencies. A number of Partner responses during interviews and workshops suggested the need and desire for assistance from the state to municipalities, designers, installers, and landowners. Technical assistance could take the form of assistance in policy review and analysis, support in developing technical standards through research projects, educational and training programs, BMP demonstrations, and experts-on-hand for questions. For maximum benefit, technical assistance could be coupled with guidance materials and financial assistance.

2.1.2.4 Public Education

For effective implementation of LID to take place, members of the regulated community (i.e., designers and installers), government, and landowners (consumers) must all cooperate. The regulated community must provide proper design and installation services. Government must provide an appropriate regulatory framework. Consumers must demand quality goods and

services and must properly operate and maintain installed BMPs. Consumers will need to be made aware of their role and then behave according to it. Public education is, therefore, important to raise awareness of the consumer public. Public education may take a variety of forms:

- Fact sheets and brochures
- Public service announcements
- Workshops and classes
- Grassroots outreach

Education may also be provided through a variety of outlets:

- Government agencies
- Service providers
- Nongovernmental organizations
- Educational institutions

A public education program could be developed to work through a variety of forms and media and could be delivered through a variety of outlets. Stormwater public education programs have been developed for a number of states and cities. San Diego's Think Blue Program for stormwater—which includes public service announcements, an adaptable program template, and measurement of behavior change—makes a good example. Similar approaches could be created for LID and could be structured to include behavior-change elements and measurement.

2.1.3 Stormwater Utility Districts

As part of this project to evaluate the incorporation of LID into the SGP, DEP has included consideration of stormwater utilities. To date, no stormwater utilities have been implemented in Connecticut; however, in other states stormwater utilities are generally used to provide a revenue stream at the local level and may be established on a regional (e.g., watershed) basis. A full discussion on the potential use of stormwater utilities in Connecticut has been provided as part of Technical Memorandum 2.

2.1.3.1 Stormwater Utility Subcommittee

Implementation of stormwater utility districts in Connecticut will necessitate development of significant new policy, programs, and administrative structures. To make new policy, programs, and administrative structures efficient and service oriented, proponents from different levels of government and interested municipalities may wish to meet in a subcommittee to identify opportunities to cooperate in developing common approaches.

2.1.3.2 Guidance Document

Prior to pursuing stormwater utility districts at any governmental level, an approach to fee-setting and bureaucratic structure should be considered. It may be helpful to develop a model stormwater utility district ordinance and guidance manual for utility district development and implementation in Connecticut. To ensure usefulness, guidance materials should be vetted through a test group of likely users of the guidance document. A subcommittee, such as the one described in *Section 2.1.4.1*, would make a good test group.

2.1.3.3 Technical and Financial Assistance Program

Starting new programs, such as stormwater utility districts, creates a draw on resources and requires development of technical expertise at the point of implementation. This is typically made easier with technical and financial assistance from an oversight organization or agency. An assistance program could be established for entities interested in developing or enhancing stormwater utility districts. If a stormwater utility subcommittee is developed (see *Section 2.1.4.1*), the technical and financial assistance program could be developed in consultation with the subcommittee to ensure a comprehensive input.

2.1.3.4 Public Outreach and Awareness Toolbox

Research on stormwater utility districts around the country shows that public awareness and support are critical issues in establishing successful stormwater utility districts. How will municipalities know if they have the level of public acceptance necessary to establish a stormwater utility district? What is the most effective way to educate the general public about the nature and benefits of stormwater utility districts? A program of public education and outreach could be designed and developed to assist local governments in developing stormwater utility districts. If a stormwater utility subcommittee is developed (see *Section 2.1.4.1*), the public outreach and awareness toolbox could be developed in consultation with the subcommittee to ensure a comprehensive input.

2.1.3.5 Delegation of Regulatory Authority

In Connecticut, permitting related to stormwater management for land-use development occurs at both local and state government levels. However, multiagency permitting can create unintentional conflict and local governments may feel constrained to adhere strictly to state decision making. Because stormwater utility districts can provide a greater and more consistent level of resources than general taxation (the typical source of stormwater management funding at the municipal level), a utility district may make full stormwater permitting and management possible on the local level. This may make it practicable for DEP to delegate state permitting authority to local agents.

2.1.4 Hybrid Option

A "hybrid" approach (i.e., combination of alternatives) was suggested in the carousel activity as part of Workshop 2. A hybrid option could involve parallel initiatives to:

- Revise the *Connecticut Stormwater Quality Manual* and *Connecticut Soil Erosion Sediment Control Guidelines* to include LID.
- Update the SGP with a variety of new LID policy.
- Build a nonregulatory support system for LID implementation.
- Enable and encourage stormwater utility districts.

To maximize the benefits and allow flexibility, the state could institute a multitrack permitting process. Such an approach could be implemented at either the state or local level through delegation of authority. Many possible multitrack configurations exist and a specific approach may be somewhat difficult to envision. To illustrate the general idea of a hybrid option, one hypothetical example for the construction general permit, which combines designer licensing, cap and trade, specific performance standards for LID, and adjusted standards for TMDLs, is presented below.

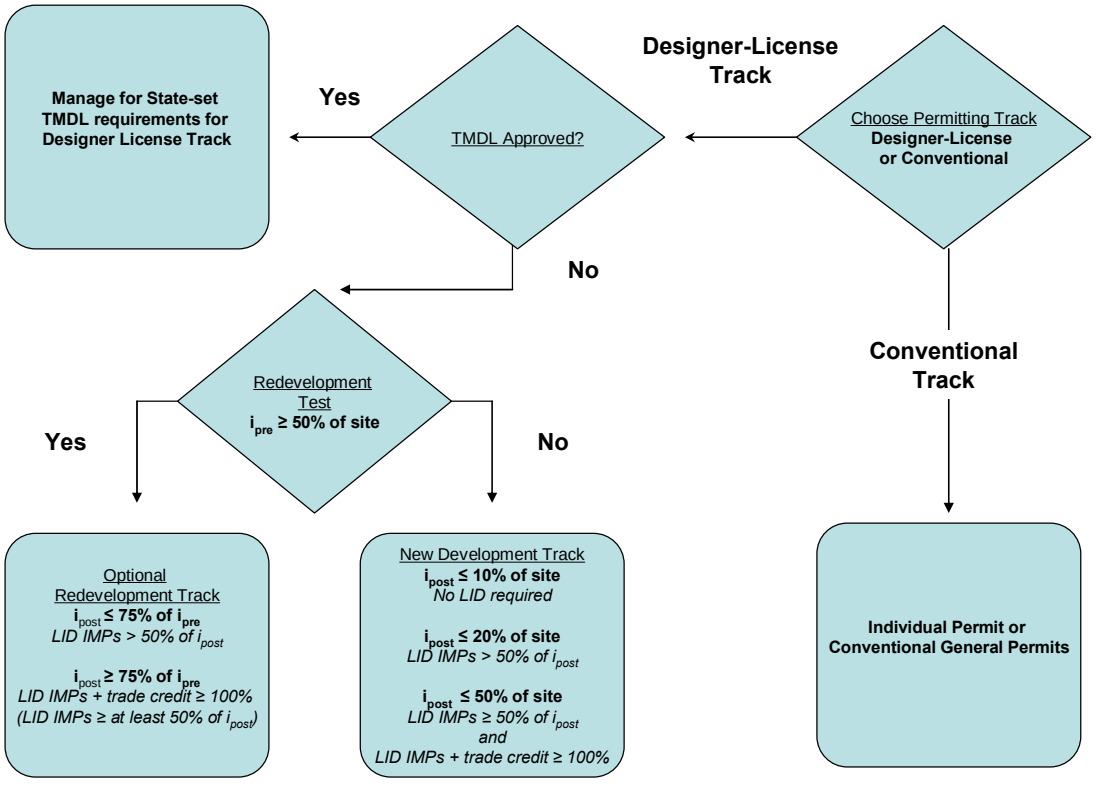


Figure 1—Flow diagram of a hypothetical hybrid option including designer licensing, special requirements for TMDLs, redevelopment standards, and graduated permitting standards.

This hypothetical approach includes the following features:

- Applicants may choose to use conventional approaches such as an individual permit or other general permit.
- Applicant's plans and notices of intent must be signed and stamped by a designer with a designer license.
- DEP may establish special LID requirements in TMDLs for the designer license track.
- Designer licensing is used for both new development and redevelopment. A threshold of the pre-existing impervious surface (i_{pre}) is used to test for whether a site is considered a development or redevelopment site. For the purpose of example, this threshold is set at 50 percent. To use the redevelopment general permit, applicants must take one of two approaches:
  - Removal of 25% of preexisting impervious surface and 50% of the post-development impervious surface (i_{post}) must be managed with LID IMPs; or
  - Manage at least 50% of the impervious surface with LID IMPs and manage the remaining 50% with IMPs and LID trading credits.
  - A hypothetical set of impervious surface limits is used to set graduated requirements for the new development track:
  - Sites developed at less than 10% impervious are not required to use LID. This does not preclude the use of LID. Ten percent was selected because national studies show that development of watersheds at less than 10% impervious creates no measureable deleterious effect on water quality.
  - For sites newly developed at up to 20% impervious, at least 50% of post-development impervious surface must be managed with LID.
  - For sites newly developed at up to 50% impervious, LID IMPs must be used onsite to manage at least 50% of postdevelopment impervious surface and the remaining impervious surface must be managed with either LID on site or through trading LID management of impervious surface from another site.

While a multitrack process improves flexibility and allows for graduated standards, it adds complexity to the process. Partners should consider whether the benefits of flexibility outweigh potential issues associated with a more complex approach.

2.2 Incorporating LID Performance Goals and Criteria in General Permits

Performance goals could be incorporated into general permits in a wide variety of ways. There is really no single correct or ideal way to do this. Thus the actual method selected will ultimately be a matter of best judgment and stakeholder preference. Thus far in this project, research on methods of incorporating LID performance goals and criteria in general permits has followed a three-pronged approach:

- Partner interviews
- Web research and interviews to determine approaches used by other states
- Interactive workshop activities

The process of making this selection should also reflect the approach chosen to incorporate LID standards into state stormwater policy. As the LID incorporation approach is yet to be determined, the precise method to incorporate performance is also undecided. Therefore, the remainder of this section provides our findings to date.

2.2.1 Partner Interviews

As a first step to determine preference, Partners were asked for their ideas as part of telephone interviews. The interview process is described in *Section 3.2.3.3* of Technical Memorandum 1. During each interview with Partners, the following questions were asked:

How do you think they [LID practices] *should be incorporated into DEP policy?*

a. *By reference to a document*
b. *Specific standards*
    i. *Narrative standard*
    ii. *Prescriptive design standard*
    iii. *Numeric standard*
    iv. *Performance standard*
c. *Other methods*

Responses provided no clear consensus on an implementation approach. In fact, many respondents specifically stated that they were unsure, unqualified to answer, or needed to give the matter further consideration; however, generally speaking, interviewees that provided a specific response seemed to be calling for flexibility by indicating preference for guidance (26% of respondents) and performance standards (26%). Responses were essentially split on whether or not to regulate, with no regulation being preferred by five respondents and regulation being preferred by six respondents.

2.2.2 Approaches Used by Other States

A desire to establish clear standards and maintain flexibility appears to be common in other states, as most states that include LID in regulation have established hybrid approaches that involve flexible regulation, guidance and performance standards. Findings from state reviews indicate other regulatory agencies use one or a combination of these methods.

- A LID manual established as guidance only. In Connecticut, a LID stormwater document could lay out a LID process as well as discuss best management practices and performance criteria for implementation. State GPs could reference the LID manual as a guidance document.
- As an alternative to the bullet above, Connecticut could develop a LID manual but opt to not reference it in the State GPs.
- Incorporate LID directly into State GPs or into regulation or policy. Performance goals and criteria could be established in the State GPs or regulation. Flexibility could be incorporated into this method by either requiring or encouraging LID. Several states have taken similar approaches in combination with a design manual.

2.2.3 Findings from Interactive Workshop Activities

Two workshops with Partners have been held to date. Activities in these workshops have included card storming and a carousel activity. These activities are fully described in the Workshop 1 and Workshop 2 meeting summaries. Through workshop activities, Partners have indicated that the standard should be a uniform, statewide policy that is adopted at both the state and local levels and that standards implemented should translate across multiple permitting programs. Additional features of such policy should include:

- Water quality standards.
- Soil erosion standards.
- Groundwater recharge standards.
- Runoff reduction standards.
- Impervious reduction standards.
- Maintenance requirements.
- Process for verifying effectiveness.
- Process for considering innovation.

2.3 Methods for Giving LID Priority in Stormwater General Permits

In interviews conducted with Partners,[3] most interviewees (18 of 27) expressed a desire to include LID as BMPs of choice versus end-of-pipe BMPs. A number of respondents pointed out that such a requirement should include flexibility to address situational issues.

Standards used by other states[4] to establish priority LID over end-of-pipe controls include:

- Requiring that a percentage of runoff volume is managed using LID.
- Requiring set-aside of an area of a site for LID (e.g., Using a related approach, Wisconsin requires set-aside of 1 - 2% of each development site for infiltration).

Impervious surface reduction could be required at redevelopment sites to reduce the need for end-of-pipe BMPs. This approach is currently being used in several other states. The standards could be written to address other situational issues such as soil type and specific water quality concerns.

[3] Refer to Summary 1 and Technical Memorandum 1 for further discussion of the interviews with Partners.

[4] Refer to Summary 2 and Technical Memorandum 1 for further discussion of standards used by other states.

Two basic approaches have been identified to incorporate LID priority into the general permits:

- One or more specific standards requiring LID, such as the two discussed above, could be written into the SGPs.
- Specific standards or a LID design process could be written into the Connecticut Stormwater Manual or a supporting document. The Connecticut Stormwater Manual or supporting document could then be referenced in the SGPs as a required design standard.

These alternatives imply a tradeoff. If LID-priority standards are written into the SGP, the standards are clearly established for the regulated community. Referencing the Connecticut Stormwater Manual creates an indirect standard, which is by its nature somewhat less clearly anchored in policy. On the other hand, a LID-priority standard, which is written into the SGP, will need to be fairly concise. LID, however, is a process-oriented approach, which is generally better suited to the flexibility of a guidance manual.

3 Rationale for Selection of Alternatives

In part, this project has been designed to result in Partner identification of five or more alternatives to incorporate LID into the Connecticut SGP and then selection of alternatives, using a rational process, for further development. To date research, interactive workshops, and interviews with Partners have resulted in the identification of a number of alternatives grouped into three general implementation approaches; a set of six selection criteria; and a list of strengths, benefits, weaknesses, and dangers of each of the three general implementation approaches. This section of Technical Memorandum 3 compiles this information and discusses the approach used in the selection of alternatives for further development and consideration.

3.1 Candidate Alternatives for Selection

Alternatives are listed below categorized into groups by type of implementation approach. Each of the alternatives is described above in *Section 2.1* of this summary document.

Regulatory
Update the Manual/Guidelines
- Standalone LID update
- Appendix to the Manual/Guidelines
- Direct incorporation into the SGP

Incorporating Standards into the SGP
- Reference the Manual/Guidelines in the SGP as requirement
- Reference the Manual/Guidelines in the SGP as guidance
- Write specific standards from the Manual/Guidelines into the SGP

Designer licensing
Impervious surface cap and trade
Adjusted standards for areas of special concern

Nonregulatory
Training program
Financial incentives
Technical assistance
Public education

Stormwater Utility Districts
Stormwater Utility Subcommittee
Guidance document
Technical and financial assistance program
Public outreach and awareness toolbox
Delegation of regulatory authority

Hybrid Option

3.2 Selection Criteria

The six selection criteria were adapted from a card storming exercise conducted in workshops 1 and 2. The full results of this process are provided in Technical Memorandum 1. Generally, this exercise indicates that the implementation approach should be:

Economically Viable—Meaning cost effective and sensitive to market demand.

Knowledge-Based—Meaning based on good science, implemented by knowledgeable people, acceptable to the public, and focused on behavior change.

Clear and Understandable—Meaning simple and uniform statewide approach that is easy to administer and enforce at the local level.

Practicable and Flexible—Meaning not burdensome to comply with, sensitive to site constraints and project type, leaving room for innovation and being performance based.

Administrable—Meaning compatible with other state regulations, allowing for alignment of municipal policy with state LID policy, supportive of contractors and homeowners, enforceable, measurable, certain, and strict.

Environmentally Beneficial—Meaning focused on impervious surface reduction, soils, water quality and quantity, groundwater recharge, fixing impairments and conservation.

3.3 Comparing Candidate Alternatives Using Selection Criteria and Data from Workshop 2

During Workshop 2, Partners participated in a carousel activity that was used to explore the strengths, benefits, weaknesses, and dangers of implementation approaches. A full description of this workshop is provided in Workshop 2 Summary (see *Appendix A*). The table below aligns the results of the carousel workshop with the criteria identified through card storming and presented in *Section 3.2* (above). This tabular summary allows for the comparison of the advantages and disadvantages of the three general types of implementation approaches; however, the hybrid alternative is not included as it is yet to be defined.

Table 1
Summary of General Alternatives and Criteria for Decision Making

Type of Approach	Economically Viable	Knowledge-Based, Behavioral Change	Clear and Understandable	Practicable and Flexible	Administrable	Environmentally Beneficial	Other
Regulatory		<u>Strengths</u> Experience People know… Mandatory	<u>Strengths</u> Clarity/uniformity		<u>Strengths</u> No free rider/fairness Helps municipalities justify		
	<u>Benefits</u> Avoids externalizing costs	<u>Benefits</u> Will get LID implemented Ensures most use of LID	<u>Benefits</u> Transparency Consistent standard		<u>Benefits</u> Quick goal attainment	<u>Benefits</u> Public health-flood mitigation Fixes biggest problems	
	<u>Weaknesses</u> Bureaucracy/cost Not market viable	<u>Weakness</u> Lack of experience	<u>Weaknesses</u> Difficult to be uniform	<u>Weakness</u> Mandatory Flexibility of industry/towns Compliance at local level Problem to implement at existing facilities Bureaucracy	<u>Weaknesses</u> Enforcement (staff) Municipal ability to implement		
		<u>Dangers</u> Municipal knowledge Applicant knowledge	<u>Dangers</u> State/municipal conflict	<u>Dangers</u> Not enough flexibility Carved into marble Hard to modify flaws Not applicable on every site	<u>Dangers</u> Limited enforcement State/municipal conflict Municipal ability to implement		
Nonregulatory	<u>Strengths</u> Financial benefit for small contractor/operator	<u>Strengths</u> Behavior change Politically palatable Educates the public and encourages voluntary buy-in Larger buy-in across the board		<u>Strengths</u> Keeps options open Flexible			
	<u>Benefits</u> Economic development	<u>Benefits</u> Training and education		<u>Benefits</u> Experimentation Demonstration projects		<u>Benefits</u> …Environmental benefits will follow	<u>Benefits</u> Variable funding sources
		<u>Weakness</u> Might not be a priority	<u>Weakness</u> People have a choice to opt out Uncertainty for local	<u>Weaknesses</u> Nonmeasureable/predictable	<u>Weaknesses</u> May not be implementable (staff and resources)		

			boards and commissions No consistent application of LID		Funding may be difficult Provides no incentive for meeting regulatory requirements Fails to comply with CWA At odds with current regulations		
		Dangers Political process Becomes a low priority	Dangers Consistency Free-rider	Dangers Status quo	Dangers Need incentives for developers		
Stormwater Utility Districts			Strengths Local authority and control		Strengths Piggyback on existing regional groups (e.g., water and sewer authorities like MDC) Removes stormwater from politics	Strengths Watershed based	Strengths Regional Partnerships
		Benefits Education Taxpayer expectations	Benefits Local authority and control	Benefits Could adapt to local geographical conditions	Benefits Dedicated funding stream Accountability Raises revenues, funds	Benefits Reduction of impervious cover Comprehensive approach to water management; interrelationship	Benefits Businesses/owners working together
	Weaknesses Cost to towns Cost to regulated community Existing IC may have disproportionate cost	Weaknesses Political will to accept regionalization Removes public input			Weaknesses Legal framework How to measure success? Regional/town conflicts		
		Dangers Political conflicts Public perception "tax" CT legislature won't add new tax	Dangers Voluntary or required that every town have/join one?		Dangers Overlapping authorities need to coordinate Who sets the fee and how?		

4 Selection of Alternatives in Cooperation with the Partners

With implementation alternatives, selection criteria, and strengths, benefits, weaknesses and dangers identified, it is possible to compare alternatives, make adjustments to alternatives so that they better address the selection criteria, select an appropriate alternative or set of alternatives for implementation, and plan a course of action. As this project is designed to conduct selection of alternatives in cooperation with the Partners, Workshop 3 was used as a vehicle for the selection process. The selection process involved three steps:

- Preparation for Workshop 3
- Exploring Alternatives—Café Workshop
- Identifying Preferred Alternatives Based on Criteria—Dot Voting Using a Criteria Matrix

4.1 Preparation for Workshop 3

In advance of Workshop 3, Partners were provided with *Summary 4: Rationale for Selection of Two Alternative Scenarios for Implementation,* which included a summary of alternatives (see *Section 2* of this TM) and a rationale for selection of alternatives (see *Section 3* of this TM), and were asked to consider the following questions:

- Is there a single alternative or general alternative type that can clearly meet all the selection criteria?
- Is there a combination of alternatives that could be used to clearly meet all the selection criteria?
- Are there adjustments that could be made to the proposed alternatives to make them more effectively meet the selection criteria?
- Are there alternatives that have yet to be considered that could better address the selection criteria?

Partners were also asked to consider the form that LID standards should take relative to the *Stormwater Quality Manual* and *Soil Erosion and Sediment Control Guidelines* as well as the SGP. Current alternatives include:

Manual/Guidelines

- Standalone LID documents.
- Appendix to the Manual/Guidelines.
- Full update of the Manual/Guidelines.

SGP

- Reference to the Manual/Guidelines in the SGP as a requirement.
- Reference to the Manual/Guidelines in the SGP as a guidance document.
- A specific written standard in the SGP.

4.2 Exploring Alternatives—Café Workshop

A café workshop is an effective vehicle for opening up conversations and discussions as it allows people to engage each other in dialogue with the aim of learning from each other rather than debating. During Workshop 3 (August 31, 2010), Partners were asked to participate in a café workshop.

The purpose of the café workshop was introduced at the outset of Workshop 3 as follows:

- Examine ideas about how alternatives work together
- Have an open dialog about alternatives
- Leverage collective knowledge
- Elicit innovation and good decision making

Photograph 1—Café workshop in process.

Specifically, the café workshop involved the following steps:

- Split into groups (about 4 to 6 people per group) and pick a "reporter."
- Open café i.e., discussion about alternatives (20 minutes).
- Document results (10 minutes).
- Reporter presents findings and notes any new alternatives (2 minutes for each reporter).

Setup of each café workshop station (i.e., table) is diagramed in *figure 1* (right) and included multicolor markers, a paper "table cloth" for brainstorming and documentation, six seats, and copies of Summary 4 for participant reference.

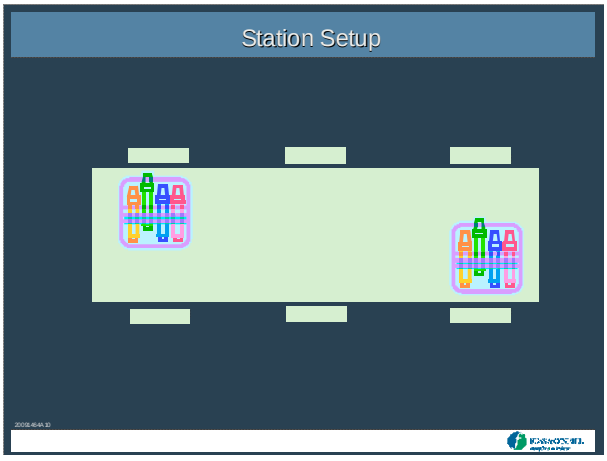


Figure 2—Café station set-up.

At the end of the café workshop, reporters reported results by group.[5] The written results from each group are provided in *Appendix B* of this Technical Memorandum.

[5] Groups were not actually named or numbered during the exercise. Group numbers are provided in this summary for the sole purpose of differentiating the reports from each group.

In a café workshop, the primary purpose is to examine ideas with other stakeholders and gain and understanding of their perspective. Specific findings from each group are less important than the collaborative process and sharing of ideas. New ideas often arise through this process; and in the case of the August 31 café workshop, two new alternatives for implementation of LID were brought forward:

- Development of a LID certification or award process, analogous to the Leadership in Energy and Environmental Design.
- Development of a municipal LID certification or award process.

4.3 Identifying Preferred Alternatives Based on Criteria—Dot Voting Using a Criteria Matrix

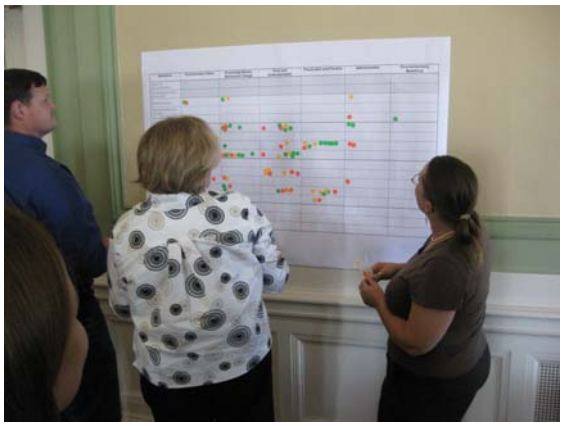
Dot-voting is a method for establishing agreement on alternatives among a large number of people. Participants "vote" on alternatives using a specified number of dot stickers. As part of Workshop 3, following the café workshop, Partners were asked to participate in a dot-voting exercise. The approach used dot-voting in combination with a criteria matrix. A criteria matrix allows for evaluation of alternatives based on specific predetermined criteria. The matrix dot-voting approach makes it possible to for a group to select preferred alternatives and identify why they selected them.

The purpose of the dot-voting workshop was described prior to the exercise as follows:

- Identify alternatives for immediate development
- Determine how alternatives compare with criteria
- Determine how alternatives fit best together when considering criteria

The dot-voting workshop included the following steps:

- Participants were each given 15 dots.
- Participants then identified which alternatives should be implemented first and which criteria they match by placing dots (5 minutes).
- Discuss results (10 minutes).



Photograph 2—Dot-voting workshop in process.

Dots were placed on a large paper sheet, which was set up as follows with alternatives on the vertical axis and criteria on the horizontal axis. The results of the dot voting are shown below:

Photograph 3—Dot-voting results.

Tally of the dot votes by alternative and criteria is shown in the following table. **The five alternatives receiving the most votes overall are shown in pale blue**. **The two highest scoring alternatives for any specific criteria are shown in violet**. This designation is primarily for reader reference and should not be interpreted to mean the alternatives have been "selected."

Table 2
Results of Dot-Voting

Type of Alternative	Alternative	Economically Viable	Knowledge-Based, Behavioral Change	Clear And Understandable	Practicable And Flexible	Administrable	Environmentally Beneficial	
Regulatory	Update the Manual/Guidelines							
	Incorporating Standards into the SGP							
	Designer licensing	3	9		1	4		17
	Impervious surface cap and trade						2	2
	Adjusted standards for areas of special concern	6	3		14	3	5	31
Nonregulatory	Training program	4	11	7	5	2	6	35
	Financial incentives	18			2		6	26
	Technical assistance	6	2	2	17	2	8	37
	Public education	4	15	10	2		4	35
Stormwater Utility	Stormwater Utility Subcommittee	15	1				6	22
	Guidance document	1	3	14	3	2	8	31
	Technical and financial assistance program	6	4			2	6	18
	Public outreach and awareness toolbox	2	9	6	7		2	26
	Delegation of regulatory authority	1			4	1		6
New Alternatives as of Workshop 3	LID Cert./Award	3	8		2	2		15
	Municipal Cert.	3	11	4			1	19
		72	76	43	57	18	54	

Notes:

1. The five alternatives receiving the most votes overall are shown in pale blue. The two highest scoring alternatives for any specific criteria are shown in violet.

4.4 Observations from the Dot-Voting and Previous Exercises

The following are observations from the dot-voting process:

- Nonregulatory alternatives (e.g., training, technical assistance, and public education) tended to receive more votes than alternatives in the regulatory or stormwater utility categories. This would indicate that the Partners as a group desire to see training early in the LID implementation process.
- Alternatives with one or more of the two highest vote tallies under a criterion (violet cells) are generally one of the five alternatives with the highest total number of votes (pale blue cells). This indicates that Connecticut can probably achieve a relatively balanced LID implementation approach by working on the alternatives receiving the most total votes. For example, if Connecticut implements a nonregulatory LID program that includes a combination of training, technical assistance, and public education, the top-three rated alternatives would be addressed and the top vote getters for the criteria "knowledge-based, behavior change," "practicable and flexible," and "environmentally beneficial" would also be included.
- Based on "Table 1 Summary of General Alternatives and Criteria for Decision Making," the strengths, benefits, weaknesses, and dangers associated with nonregulatory programs make a nice compliment to regulatory programs. That is to say, regulatory alternatives are viewed as having strengths under the criteria of "clear and understandable," "administrable," and "environmentally beneficial"; while nonregulatory alternatives were viewed as having strengths and benefits under the criteria of "economically viable" and "practicable and flexible." A combination of regulatory and nonregulatory alternatives; therefore, provides strengths and benefits under the criteria of "clear and understandable," "administrable," "environmentally beneficial," "economically viable," and "practicable and flexible."
- The "training" alternatives within the nonregulatory alternatives scored highly under "knowledge-based, behavioral change" and "clear and understandable"; while public education scored highly under "clear and understandable"; and "technical assistance" scored highly under "practicable and flexible." If the partners decide to pursue nonregulatory alternatives, a combination of these three alternatives would probably provide the most balanced approach.
- The only alternatives that scored well for "economically viable" were the "stormwater utility subcommittee" and "financial incentives." Including one or more of these alternatives, even though they did not score well overall, may help to provide a more rounded approach to LID implementation.
- Development of a stormwater utility "guidance document" was one of the five top-rated alternatives. Development of stormwater utility enabling legislation would probably be necessary to make the stormwater utility guidance document meaningful.
- Although the "LID certificate/award" and "municipal certificates" were not among the top total vote getters, they are also newly developed alternatives and have yet to be fully vetted. Municipal certificate received the second highest score under the "knowledge-based, behavior change" criterion.

- If desired, "adjusted standards for areas of special concern" could probably be incorporated with the "update of the manual/guidelines" and/or "incorporating standards into the SGP." DEP has decided to pursue both of these alternatives as part of this project.
- The two alternatives receiving the fewest votes were "impervious surface cap and trade" and "delegation of regulatory authority." These alternatives should probably be set aside.
- The criteria of "administrable" and "environmentally beneficial" received the fewest total votes. "Administrable" received the lowest number with 18 total votes. This does not necessarily mean that the alternatives available are neither readily administrable nor particularly environmentally beneficial; however, exploring this issue might be instructive.

5 Next Steps

The next steps will involve identifying an implementation approach under selected alternatives, implementing that approach and measuring overall effectiveness. Workshop 4 will be used to begin this process. DEP has committed to "update of the stormwater manual and soil erosion guidelines" as well as "incorporating LID standards into the SGP."

The partners have been actively involved in strategic planning and implementation through the Low Impact Development and Stormwater General Permit Evaluation project. It is anticipated that the Partners will wish to continue to participate actively in implementation of the alternatives that they select.

Appendix A

Summary of Workshop 2

FUSS & O'NEILL

MEETING SUMMARY NOTES
EVALUATION OF STORMWATER GENERAL PERMIT AND LID
(Contract # PS2010-10172)
WORKSHOP 2—JULY 1, 2010; PHOENIX AUDITORIUM

DISTRIBUTION: Attendees and Other Project Partners
DATE: July 12, 2010

The following discussion summarizes the July 1, 2010 Workshop for the Evaluation of Stormwater General Permit and Low-Impact Development held at the Department of Environmental Protection Offices (79 Elm Street, Hartford, CT) in the Phoenix Auditorium.

A list of workshop attendees is provided at the end of this summary.

INTRODUCTIONS

Opening Remarks
MaryAnn Nusom Haverstock opened the meeting. During her opening, she pointed out that the issue of legal authority to require low impact development (LID) as part of the stormwater general permits had been vetted between the Environmental Protection Agency—New England (EPA) and Connecticut Department of Environmental Protection (DEP) and such authority is clearly present in existing state law. MaryAnn asked attendees to introduce themselves around the table. She then turned the agenda over to Fuss & O'Neill.

Introductions around the Table
Jim Riordan of Fuss & O'Neill gave a PowerPoint Presentation, entitled "Introductions, Meetings, and the Web Page." The presentation is available on:

http://www.ct.gov/dep/cwp/view.asp?a=2719&q=459488&depNav_GID=1654

Future Meeting Dates and Locations
Jim reconfirmed the next three meetings and meeting dates, which were set during Workshop 1 (May 26). The dates are as follows:

Project Meeting Dates

Workshop Title	Date to be Held
Partner Workshop 3	Tuesday, August 31, 2010
Partner Workshop 4	Wednesday, October 20, 2010
Partner Workshop 5	Wednesday, December 15, 2010

Note:
All meetings will be held from 9:15 a.m. – 11:45 a.m. in the Phoenix Auditorium at the Hartford, CT DEP Offices.

Web Page
Jim reintroduced the project web page on DEP's website:

http://www.ct.gov/dep/cwp/view.asp?a=2719&q=459488&depNav_GID=1654

The web page will be used to provide project partners and other interested parties with general project information, schedules, and deliverables.

IDENTIFYING ALTERNATIVES AND CRITERIA AND PARTNER INVOLVEMENT IN IMPLEMENTATION (continued)

At the May 26 workshop, a card storming and consensus-building session was facilitated. The session was partially completed. Therefore, the July 1 workshop involved a continuation of the session. Jim led meeting attendees in this continuation (see Photograph 1). Results included recombination of several of the card storming clusters formed during the May 26 workshop and naming of the resulting clusters.

Photograph 1—Results during the July 1 workshop included rearrangement of clustered cards as well as naming of the clusters.

Some of the specific changes included:

- Combining "Practical" and "Flexibility" into "Practicability-Flexibility."
- Moving "Conservation" into "Environmental Benefit."
- Placing "Legal Administrable" into the parking lot.[1]
- Moving "Regulation" into "Administrable."
- Changing "Economic Viability" to "Economic Market Viability."
- Naming the cards under the "+" symbol "Clear and Understandable."

A discussion point was raised about whether the flow management capacity of LID BMPs would be quantifiable and, therefore, could be used to achieve peak flow attenuation requirements. A card was added under the topic of "administrable":

- Quantifiable-measurable for other permit requirements that might duplicate.

During this session, a point was raised that some of cards and clusters were more closely related to implementation than the actual workshop question of "what are features of good LID policy?" Jim offered to the group that one solution would be to change the workshop

[1] The "parking lot" refers to holding further discussion for now in order to continue forward on other issues in the workshop. Some discussion occurred over the issue of whether or not DEP has legal authority to require LID. DEP has established this authority and intends to document it. DEP intends to document their legal authority. The topic of "administrable" was retained in place of "Legal Administrable."

question to include implementation. Ultimately, the group decided to leave the workshop question, cards, and clusters without change.

Results of the card storming exercise are shown in Photograph 2 and type written in Attachment 2. Six named clustered resulted:

- Economic Market Viability
- Clear and Understandable
- Practicable Flexibility
- Administrable
- Education
- Environmental Benefit

Photograph 2—Complete results of card storming conducted during May 26 and July 1 workshops.

STORMWATER UTILITY DISTRICTS

Jim gave a PowerPoint presentation regarding the potential role of stormwater utility districts in the implementation of LID. The presentation is available on:

http://www.ct.gov/dep/cwp/view.asp?a=2719&q=459488&depNav_GID=1654

CAROUSEL WORKSHOP

Jim introduced the carousel workshop with a PowerPoint presentation, which included a brief discussion of five implementation alternatives. The presentation is available on:

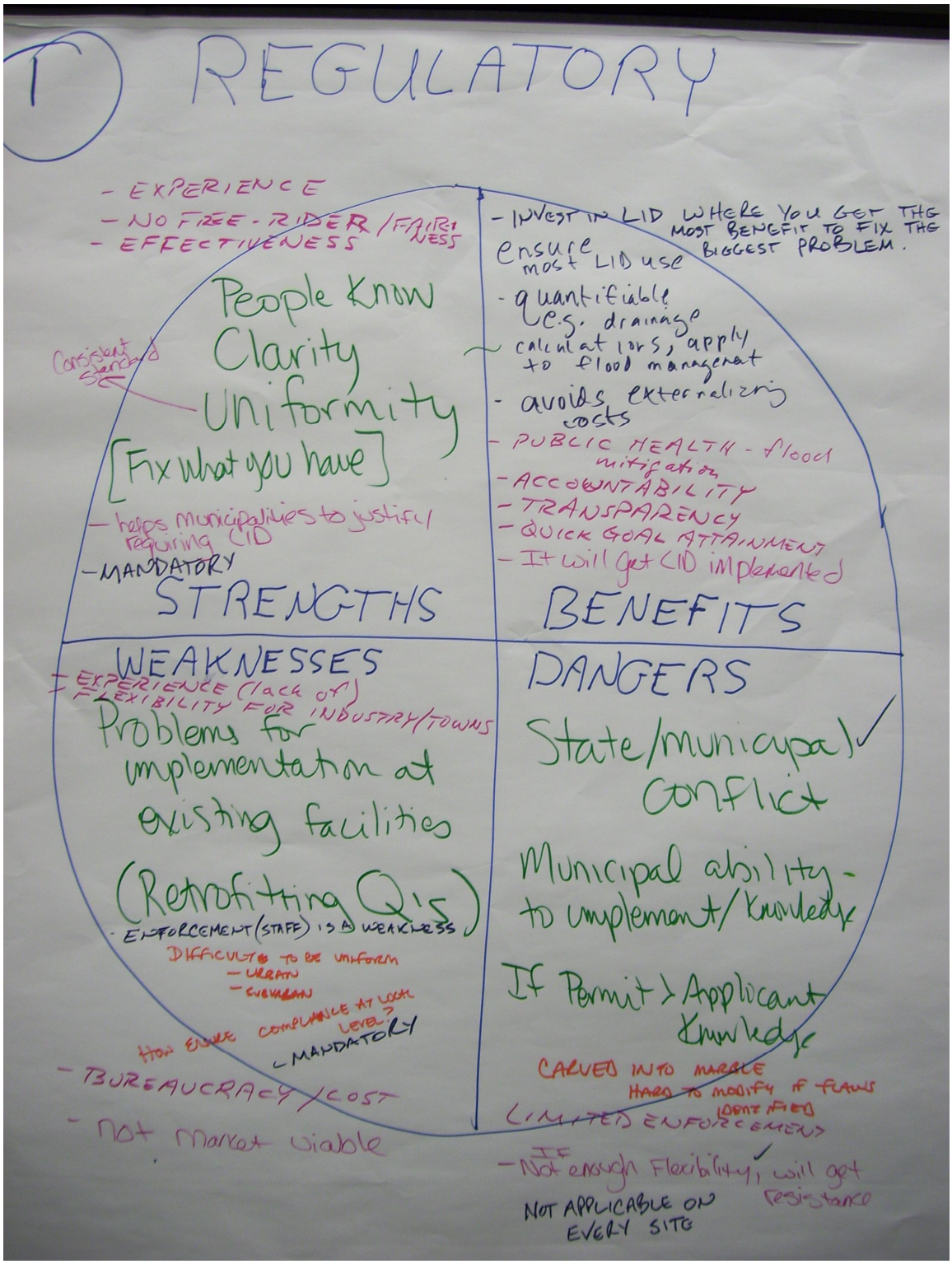
http://www.ct.gov/dep/cwp/view.asp?a=2719&q=459488&depNav_GID=1654

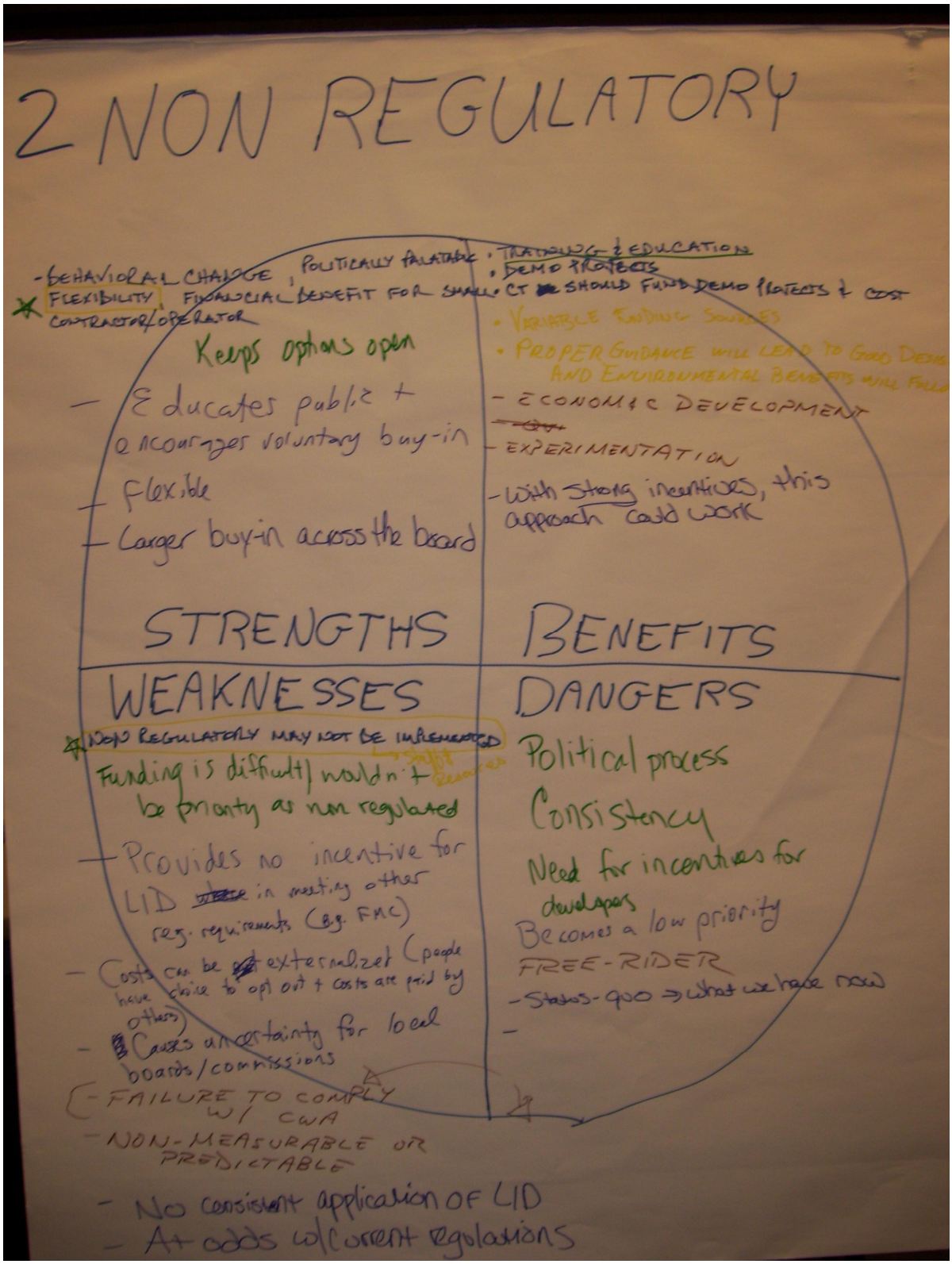
This included the following:

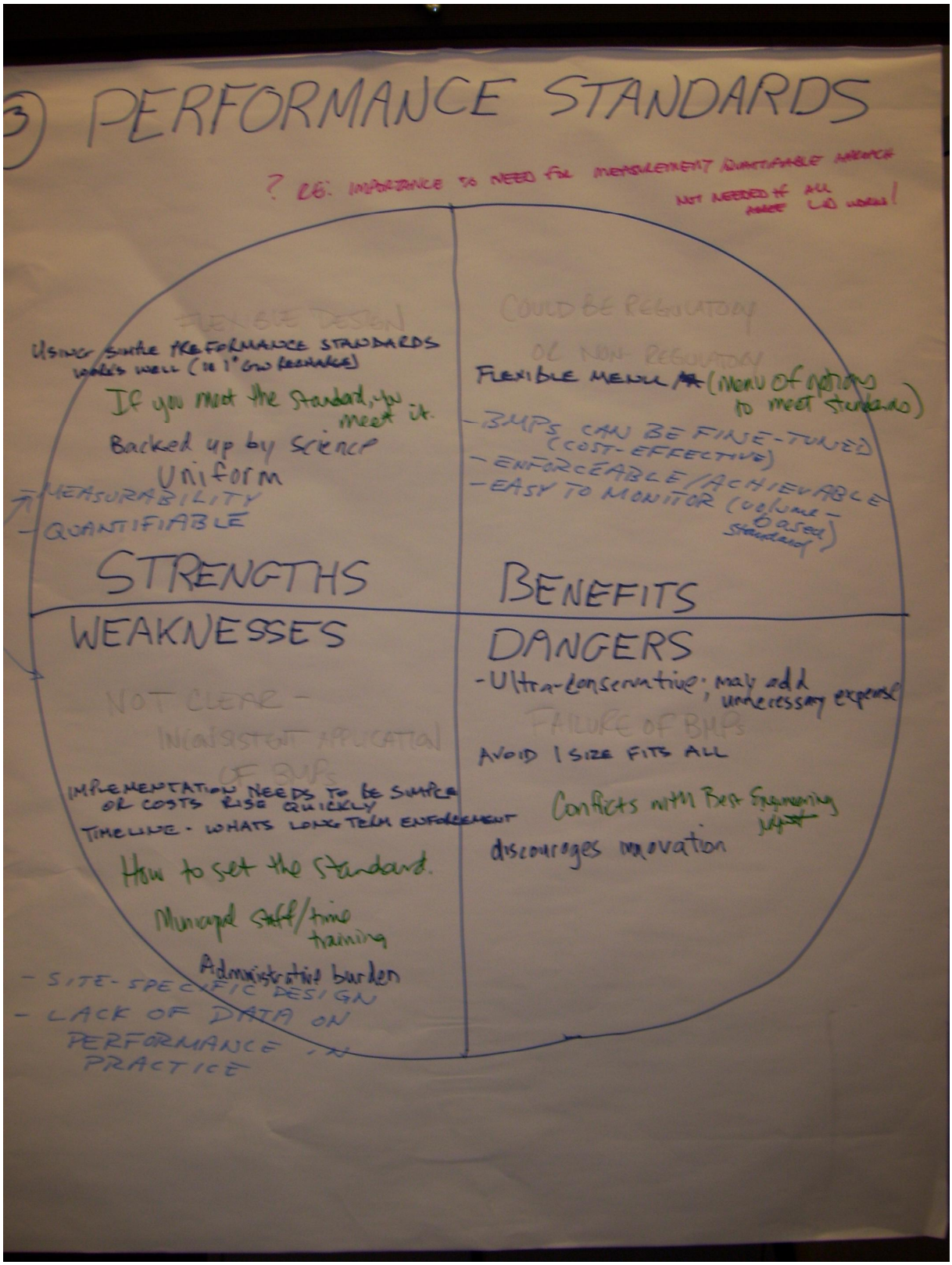
- 12 minutes each participant lists 5 pros & 5 cons for each of the 5 alternatives and 3 alternatives that haven't been considered.
- Split up into 6 groups and pick a "reporter."
- 5 minutes at each station:
  - List 5 strengths, 5 weaknesses, 5 benefits, and 5 dangers of each of the 5 alternatives
  - At Station 6, list alternatives that haven't been recommended
- Repeat process at other 5 alternatives. You can star or emphasize items you see as critical.
- Reporter presents findings (2 minutes for each reporter) at your group's last alternative.

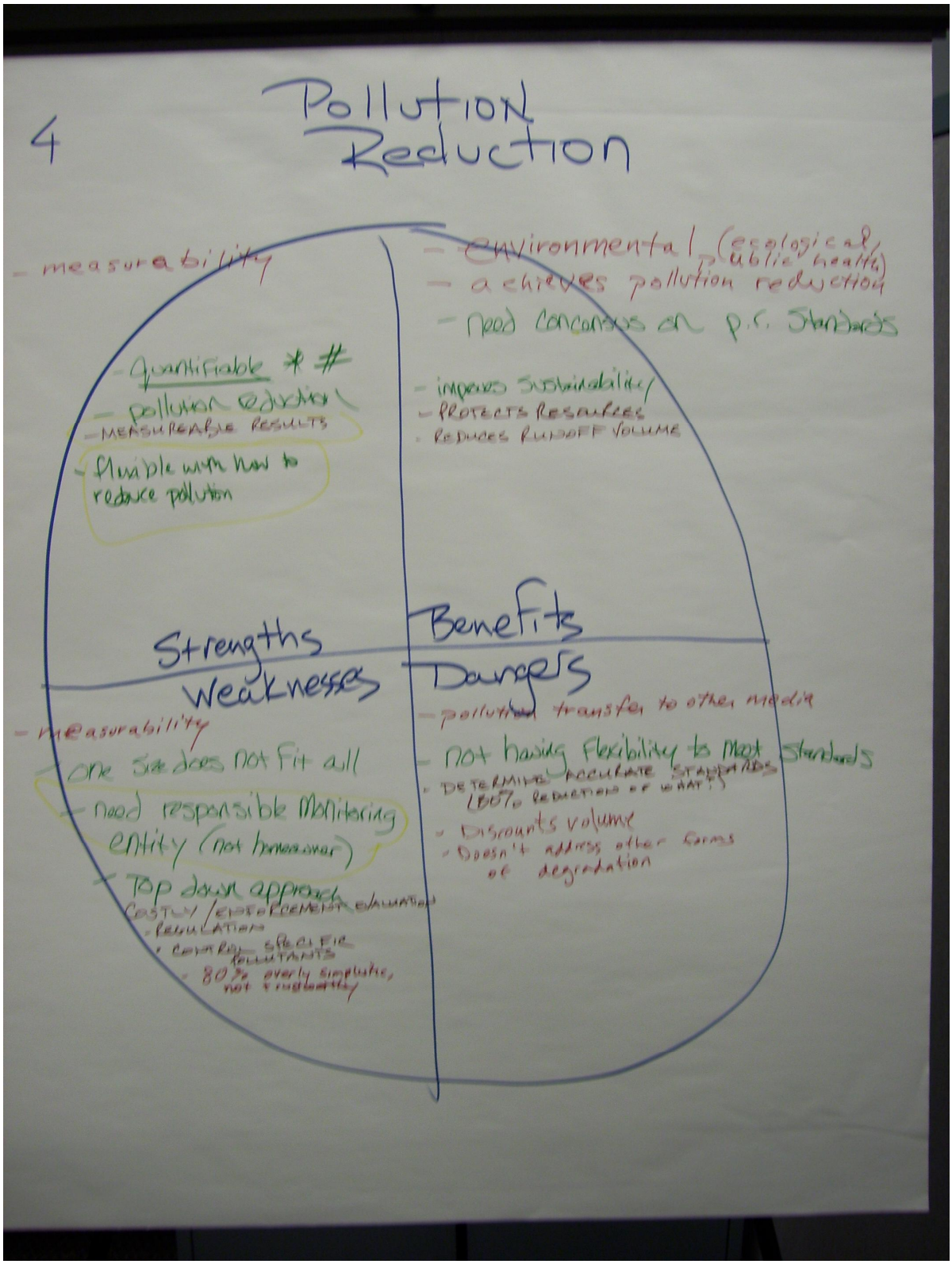
Photographs 3 - 6—Carousel workshop in process.

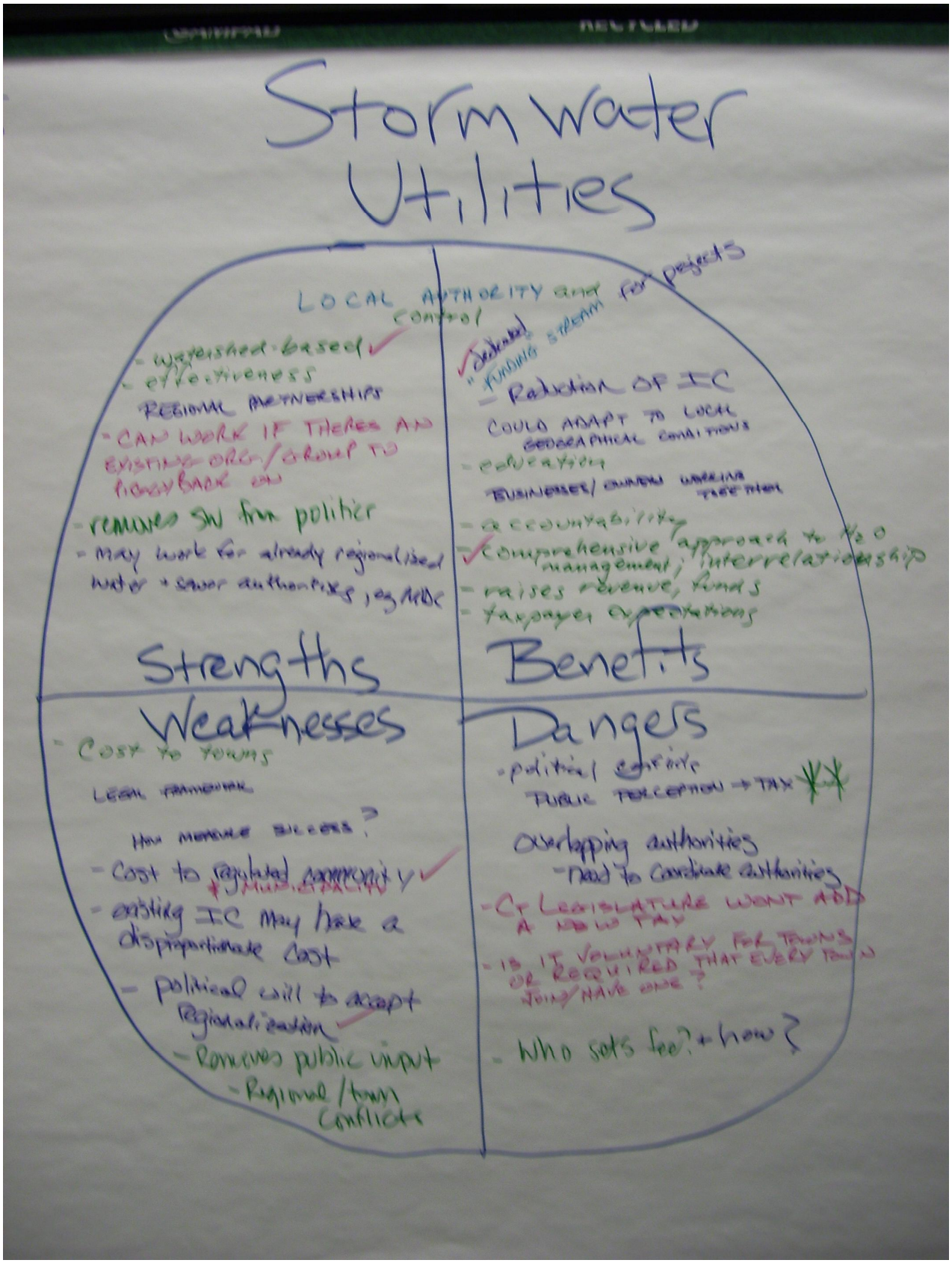
The results of the carousel workshop are shown in Photograph 2 and type written in Attachment 2.

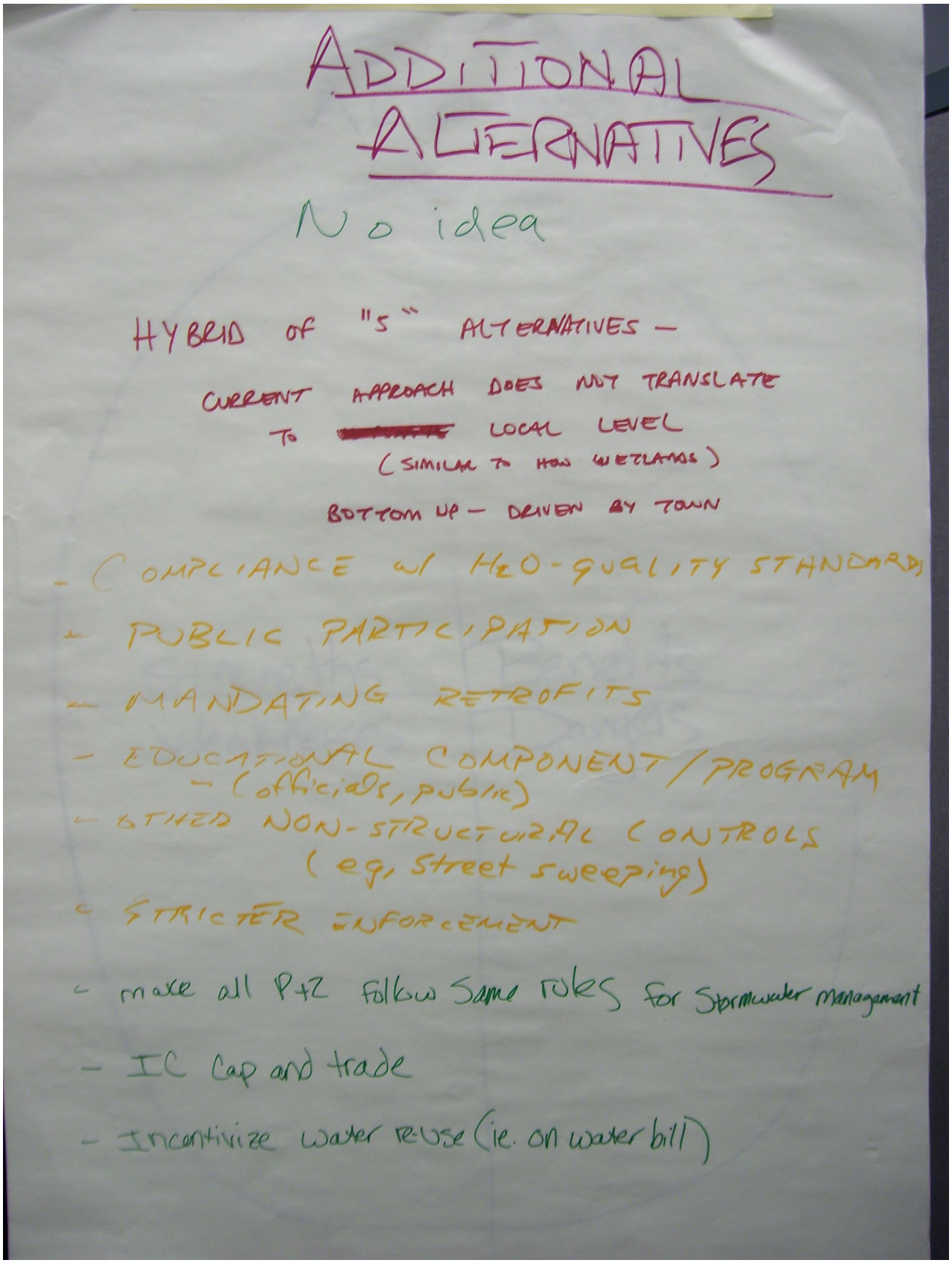



2 NON REGULATORY
- BEHAVIORAL CHANGE
FLEXIBILITY
CONTRACTOR/OPERATOR
POLITICALLY PALATABLE
FINANCIAL BENEFIT FOR SMALL
TRAINING & EDUCATION
DEMO PROJECTS
CT SHOULD FUND DEMO PROJECTS & COST
VARIABLE FUNDING SOURCES
PROPER GUIDANCE WILL LEAD TO GOOD DESIGN AND ENVIRONMENTAL BENEFITS WILL FOLLOW
Keeps options open
- Educates public + encourages voluntary buy-in
- Flexible
- Larger buy-in across the board
- ECONOMIC DEVELOPMENT
- EXPERIMENTATION
- With strong incentives, this approach could work
STRENGTHS
BENEFITS
WEAKNESSES
DANGERS
NON REGULATORY MAY NOT BE IMPLEMENTED
Funding is difficult/ wouldn't be priority as non regulated
- Provides no incentive for LID in meeting other reg. requirements (e.g. FMC)
- Costs can be externalized (people have choice to opt out + costs are paid by others)
- Causes uncertainty for local boards/commissions
- FAILURE TO COMPLY W/ CWA
- NON-MEASURABLE OR PREDICTABLE
- No consistent application of LID
- At odds w/ current regulations
Political process
Consistency
Need for incentives for developers
Becomes a low priority
FREE-RIDER
- Status-quo ⇒ what we have now
-


3) PERFORMANCE STANDARDS
? RE: IMPORTANCE TO NEED FOR MEASUREMENT QUANTIFIABLE IMPACT
NOT NEEDED IF ALL MEET LID GOALS!
FLEXIBLE DESIGN
COULD BE REGULATORY OR NON-REGULATORY
USING SIMPLE PERFORMANCE STANDARDS WORKS WELL (IE 1" GW RECHARGE)
If you meet the standard, you meet it.
Backed up by science
Uniform
- MEASURABILITY
- QUANTIFIABLE
STRENGTHS
FLEXIBLE MENU (MENU OF OPTIONS TO MEET STANDARDS)
- BMPS CAN BE FINE-TUNED (COST-EFFECTIVE)
- ENFORCEABLE/ACHIEVABLE
- EASY TO MONITOR (VOLUME-BASED STANDARD)
BENEFITS
WEAKNESSES
NOT CLEAR - INCONSISTENT APPLICATION OF BMPS
IMPLEMENTATION NEEDS TO BE SIMPLE OR COSTS RISE QUICKLY
TIMELINE - WHATS LONG TERM ENFORCEMENT
How to set the standard.
Municipal staff/time training
Administrative burden
- SITE-SPECIFIC DESIGN
- LACK OF DATA ON PERFORMANCE IN PRACTICE
DANGERS
- Ultra-conservative; may add unnecessary expense
FAILURE OF BMPS
AVOID 1 SIZE FITS ALL
Conflicts with Best Engineering Judgment
discourages innovation


4
Pollution Reduction
- measurability
- quantifiable * #
- pollution reduction
- MEASUREABLE RESULTS
- flexible with how to reduce pollution
- environmental (ecological, public health)
- achieves pollution reduction
- need concerns on p.c. standards
- improves sustainability
- PROTECTS RESOURCES
- REDUCES RUNOFF VOLUME
Strengths
Weaknesses
Benefits
Dangers
- measurability
- one size does not fit all
- need responsible monitoring entity (not homeowner)
- top down approach
COSTLY / ENFORCEMENT EVALUATION
- REGULATION
- CONTROL SPECIFIC POLLUTANTS
- 80% overly simplistic, not troublesome
- pollution transfer to other media
- not having flexibility to meet standards
- DETERMINE ACCURATE STANDARDS (100% REDUCTION OF WHAT?)
- Discounts volume
- Doesn't address other forms of degradation


Storm water Utilities
LOCAL AUTHORITY and control
- watershed-based
- effectiveness
REGIONAL PARTNERSHIPS
- CAN WORK IF THERES AN EXISTING ORG/GROUP TO PIGGYBACK ON
- removes SW from politics
- may work for already regionalized water + sewer authorities, eg MDC
Strengths
Dedicated funding stream for projects
- Reduction of IC
COULD ADAPT TO LOCAL GEOGRAPHICAL CONDITIONS
- equitable
BUSINESSES/OWNERS UNDERIMP TREATMENT
- accountability
- comprehensive approach to H2O management/interrelationship
- raises revenue, funds
- taxpayer expectations
Benefits
Weaknesses
- Cost to towns
LEGAL FRAMEWORK
How measure success?
- Cost to regulated community
- existing IC may have a disproportionate cost
- political will to accept Regionalization
- Removes public input
- Regional/town conflicts
Dangers
- political agenda
PUBLIC PERCEPTION → TAX
overlapping authorities
- Need to Coordinate authorities
- CT LEGISLATURE WONT ADD A NEW TAX
- IS IT VOLUNTARY FOR TOWNS OR REQUIRED THAT EVERY TOWN JOIN/HAVE ONE?
- Who sets fee? + how?



ADDITIONAL ALTERNATIVES

No idea

HYBRID OF "5" ALTERNATIVES –

CURRENT APPROACH DOES NOT TRANSLATE TO [redacted] LOCAL LEVEL
(SIMILAR TO HOW WETLANDS)

BOTTOM UP – DRIVEN BY TOWN

- COMPLIANCE w/ H_2O-QUALITY STANDARDS
- PUBLIC PARTICIPATION
- MANDATING RETROFITS
- EDUCATIONAL COMPONENT/PROGRAM – (officials, public)
- OTHER NON-STRUCTURAL CONTROLS (eg, Street sweeping)
- STRICTER ENFORCEMENT
- make all P+Z follow same rules for Stormwater Management
- IC Cap and trade
- Incentivize water reuse (ie. on water bill)

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NEXT STEPS

The next workshop will be held on August 31 in the Phoenix Auditorium from 9:15 to 11:45 a.m. This meeting will focus on alternatives for implementation. In preparation for the meeting Fuss & O'Neill will develop two technical memoranda regarding: (a) information gathered from partner interviews and other states; (b) the role of stormwater utilities. Fuss & O'Neill will also develop a summary document of alternatives for LID implementation and criteria for selection based on workshops 1 and 2.

ATTENDEES

Attendees of the July 1 workshop are listed below in alphabetical order by affiliation.

Attendee	Affiliation
Eric Brown	CBIA
Virginia Mason	Council of Governments Central Naugatuck Valley
Jim Langlois	Connecticut Concrete
Matthew Hallssey	Connecticut Construction Industries
Jessica Morgan	Connecticut Department of Environmental Protection
Mary-Beth Hart	Connecticut Department of Environmental Protection OLISP
Chris Malik	Connecticut Department of Environmental Protection/NPS Program
MaryAnn Nusom Haverstock	Connecticut Department of Environmental Protection/NPS Program
Chris Stone	Connecticut Department of Environmental Protection-Water Permitting
Nisha Patel	Connecticut Department of Environmental Protection-Water Permitting
Eric McPhee	Connecticut Department of Public Health
Paul Corrente	Connecticut Department of Transportation—Environmental Planning
Roger Reynolds	Connecticut Fund for the Environment
John Carrier	Connecticut Home Builders
Mike Girard	Connecticut Home Builders
Darin Overton	Connecticut Home Builders

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Bruce Wittchen	Connecticut Office of Policy and Management
Judy Rondeau	ECCD
Johanna Hunter	EPA Region 1
Jim Riordan	Fuss & O'Neill
Phil Moreschi	Fuss & O'Neill
Bill Ethier	Home Builders Association of Connecticut
Terrance Gallagher	Luchs
Greg Sharp	Murtha Cullina, LLP
John Hudak	Regional Water Authority
Kenneth Wieland	Rivers Alliance
Michael Dietz	University of Connecticut—Nonpoint Education for Municipal Officials

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ATTACHMENT 1
RESULTS OF CARD STORMING FROM JULY 1, 2010 (WORKSHOP 2)

Card Storming Question:
What are the features of good LID policy?

Objective Card Storming Aim:
Identify criteria [for determining alternatives]

Experiential Card Storming Aim:
Identify similarities [in participants ideas of good LID policy]

Economic Market Viability

- Cost effective options, not regulations
- Enough incentive to achieve success
- Recognize market demands for different development types (LID may not be for all
- Funding for implementation
- Market/demand sensitivity
- Effectiveness can be verified and maintenance is not cost prohibitive

Education

- Education component
- Knowledgeable design engineers training, <u>train</u>
- Use good science and knowledgeable people to make decisions
- Public acceptance—meaning willingness to act a local/residential scale
- <u>Greatest behavior change</u> Promote policies (regulatory and/or voluntary) that result in greatest behavior change

Clear and Understandable

- Clarity
- Uniform statewide (standardized)
- Make any guidance and/or standards simple. Make process certain.
- LID policy at the local level to adopt, enforce, implement

Practicability-Flexibility

- Practical to implement and maintain
- Not burdensome to individuals, easy to comply with
- Maintenance required
- Flexible
  - Consider site constraints
  - Consider project type
- Flexible
- Room for innovation
- Performance based (about objective, not technique)
- Bottom-up site specific approach, <u>not</u> top down.

Legal Administrable

- Easy to administer
- Aligning municipal zoning subdivision regulations (with LID)
- Encouragement TPZ, cons[ervation] subdivision regulations
- Available support structure mechanism for contractors/homeowners implementing LID
- Compatible with other regulations and goals that are necessary i.e., ADA, mosquito control, public safety, public health
- Legal
- Oversight from local and state agencies
- Enforceability
- Treats stormwater runoff with the same strict criteria that are required of on-site septic systems
- Quantifiable-measurable for other permit requirements that might duplicate
- Should be expected and standard operating procedure not as the exception

Environmental Benefit

- Manages soil erosion
- Reduction of impervious materials
- Remediates already built areas
- Promotes GW recharge
- Water quality & water quantity (groundwater (in-stream recharge) flow techniques)
- Reduces runoff
- Minimize impervious cover
- Fix impairment
- Resource based design (e.g., soils)
- Allow soil microorganisms to work
- Shift focus from engineering to conservation

Low Impact Development and Stormwater General Permit Evaluation

1. REGULATORY

STRENGTHS
- Experience
- No free-rider/fairness
- Effectiveness
- People know clarity/uniformity (consistent standard) [Fix what you have]
- Helps municipalities to justify requiring LID
- Mandatory

BENEFITS
- Invest in LID where you get the most benefit to fix the biggest problem
- Ensure most LID use
- --Quantifiable (e.g., drainage calculations, apply to flood management
- Avoids externalizing costs
- Public health – flood mitigation
- Accountability
- Transparency
- Quick goal attainment
- It will get LID implemented

WEAKNESSES
- Lack of experience
- Flexibility for industry/towns
- Problems for implementation at existing facilities (Retrofitting Q's)
- Enforcement (staff) is a weakness
- Difficult to be uniform – urban, suburban
- How ensure compliance at local level?
- Mandatory
- Bureaucracy/cost
- Not market viable

DANGERS
- State/municipal conflict ✓
- Municipal ability to implement/knowledge
- If permit – applicant knowledge
- Carved into marble
- Hard to modify if flaws identified
- Limited enforcement
- If not enough flexibility, will get resistance✓
- Not applicable on every site

2. NON REGULATORY

STRENGTHS
- Behavioral change
- Politically palatable
- Flexibility*, Financial Benefit for small contractor/operator
- Keeps options open
- Educates public and encourages voluntary buy-in
- Flexible
- Larger buy-in across the board

BENEFITS
- Training and education
- Demo projects
- CT should fund demo projects and cost
- Variable funding sources
- Proper guidance will lead to good design and environmental benefits will follow
- Economic development
- Experimentation
- With strong incentives, this approach could work

WEAKNESSES
- Non regulatory may not be implemented (Staff and resources)
- Funding is difficult/wouldn't be priority as non regulated
- Provides no incentive for LID in meeting other regulatory requirements (e.g., FMC)
- Costs can be externalized (people have choice to opt out and costs are paid by others)
- Causes uncertainty for local boards/commissions
- Failure to comply with CWA
- Non-measureable or predictable
- No consistent application of LID
- At odds with current regulations

DANGERS
- Political process
- Consistency
- Need for incentives for developers
- Becomes a low priority
- Free-rider
- Status quo – what we have now
- Failure to comply

3. PERFORMANCE STANDARDS

STRENGTHS
- Flexible design
- Using simple performance standards works well (i.e., 1" GW recharge)
- If you met the standard, you meet it
- Backed up by science
- Uniform
- Measurability
- Quantifiable

BENEFITS
- Could be regulatory or non-regulatory
- Flexible menu ** (menu of options to meet standards)
- BMPs can be fine-tuned (cost-effective)
- Enforceable/achievable
- Easy to monitor (volume-based standard)

WEAKNESSES
- Not clear - Inconsistent application of BMPs
- Implementation needs to be simple or costs rise quickly
- Timeline – What's long term enforcement
- How to set the standard
- Municipal staff/time training
- Administrative burden
- Site-specific design
- Lack of data on performance in practice
- Measurability

DANGERS
- Ultra-conservative; may add unnecessary expense
- Failure of BMPs
- Avoid one size fits all
- Conflicts with best engineering judgment
- Discourages innovation

4. POLLUTION REDUCTION

STRENGTHS
- Measurability
- Quantifiable *#
- Pollution reduction
- Measureable results
- Flexible with how to reduce pollution

BENEFITS
- Environmental (ecological/public health)
- Achieves pollution reduction
- Need consensus on p.r. [pollution reduction] standards
- Improves sustainability
- Protects resources
- Reduces runoff volume

WEAKNESSES
- Measurability
- One size does not fit all
- Need responsible monitoring entity (not homeowner)
- Top down approach
- Costly/enforcement evaluation – regulation
- Control specific pollutants
- 80% overly simplistic, not trustworthy

DANGERS
- Pollution transfer to other media
- Not having flexibility to meet standards
- Determine accurate standards (80% reduction of what?)
- Discounts volume
- Doesn't address other forms of degradation

5. STORMWATER UTILITIES

STRENGTHS
Local authority and control
- Watershed based ✓
- Effectiveness
- Regional partnerships
- Can work if there's an existing organization/group to piggyback on
- Removes stormwater from politics
- May work for already regionalized water and sewer authorities , e.g., MDC

BENEFITS
- ✓Dedicated "funding" stream for projects
- Reduction of IC [impervious cover]
- Could adapt to local geographical conditions
- Education
- Businesses/owners working together
- Accountability
- ✓Comprehensive approach to water management; interrelationship
- Raises revue, funds
- Taxpayer expectations

WEAKNESSES
- Cost to towns
- Legal framework
- How measure success?
- Cost to regulated community✓ and municipality
- Existing IC may have a disproportionate cost
- Political will to accept regionalization✓
- Removes public input
- Regional/town conflicts

DANGERS
- Political conflicts
- Public perception – tax**
- Overlapping authorities – Need to coordinate authorities
- CT legislature won't add a new tax
- Is it voluntary for towns or required that every town join/have one?
- Who sets fee and how?

6. ADDITIONAL ALTERNATIVES

- Hybrid of "5" alternatives – current approach does not translate to local level (similar to how wetlands) Bottom up- driven by town.
- Compliance with water quality standards
- Public participation
- Mandating retrofits
- Educational component/program (officials, public)
- Other non-structural controls (e.g., street sweeping)
- Stricter enforcement
- Make all P+Z [planning and zoning] follow same rules for stormwater management
- IC [impervious cover] cap and trade
- Incentivize water reuse (i.e., on water bill)

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Appendix B

Summary of Workshop 3

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MEETING SUMMARY NOTES
EVALUATION OF STORMWATER GENERAL PERMIT AND LID
(Contract # PS2010-10172)
WORKSHOP 3—AUGUST 31, 2010; PHOENIX AUDITORIUM

DISTRIBUTION: Attendees and Other Project Partners
DATE: October 12, 2010

The following discussion summarizes the August 31, 2010 Workshop for the Evaluation of Stormwater General Permit and Low-Impact Development held at the Department of Environmental Protection Offices (79 Elm Street, Hartford, CT) in the Phoenix Auditorium.

A list of workshop attendees is provided at the end of this summary.

INTRODUCTIONS

Opening Remarks
MaryAnn Nusom Haverstock opened the meeting. She then turned the agenda over to Fuss & O'Neill.

Introductions around the Table
Jim Riordan of Fuss & O'Neill gave a PowerPoint Presentation, entitled "Introductions, Meetings, and the Web Page."

Future Meeting Dates and Locations
Jim reconfirmed the next two meetings and meeting dates, which were set during Workshop 1 (May 26). The dates are as follows:

Project Meeting Dates

Workshop Title	Date to be Held
Partner Workshop 4	Wednesday, October 20, 2010
Partner Workshop 5	Wednesday, December 15, 2010

Note:
All meetings will be held from 9:15 a.m. – 11:45 a.m. in the Phoenix Auditorium at the Hartford, CT DEP Offices.

Web Page
Jim reintroduced the project web page on DEP's website:

http://www.ct.gov/dep/cwp/view.asp?a=2719&q=459488&depNav_GID=1654

The web page continues to be used to provide project partners and other interested parties with general project information, schedules, and deliverables.

REVIEW OF TECHNICAL MEMORANDA (TM) 1 AND 2

Jim led a review of TM 1 and 2, entitled respectively as follows:

- *Identification of Approaches for Including Low Impact Development and Pollution Prevention in General Permits*
- *Evaluating the Role of Stormwater Utility Districts in the Implementation of Low Impact Development*

This was followed by an open discussion of the two technical memoranda. Participants made the following comments during the open discussion:

- Federal Department of Defense has developed a LID guidance [*Unified Facilities Criteria (UFC) Low Impact Development Manual*] that may be helpful in determining accomplishment of water quality/quantity goals.
- We should provide performance goals and then give development flexibility to make applications to achieve the goals.
- Pollution prevention should be used to minimize volume of runoff at the source because prevention will reduce pollution and the amount of runoff to manage.
- Legislation has been proposed to issue bonds for stormwater utility operation and maintenance.
- Reimbursing a public utility when a roadway project presents a disturbance to a utility could impose a big expense on the state Department of Transportation.
- Municipalities have the ability to impose utility fees on sanitary sewers. This would be the same for stormwater utilities [if they were implemented]. Municipalities can install LID now and don't need a stormwater utility to do so. However, stormwater utilities could provide funding which will ensure ongoing maintenance, repairs and upgrades.

RATIONALE FOR THE SELECTION OF TWO ALTERNATIVES

Jim provided an overview of *Summary 4 Rationale for Selection of Two Alternative Scenarios for Implementation.* The overview was followed by an open discussion of the summary document. Participants made the following comments:

- Question: Has DEP decided what regulatory approaches will be included?
  - Answer: Yes, to an extent. As part of the current project scope of work, DEP has decided to:
    - (a) develop LID standards that update the *Soil Erosion and Sediment Control Guidelines* and the *Stormwater Quality Manual*;
    - (b) include LID standards in the stormwater general permits.

    The process for how this happens will be decided by the Partners. Other implementation elements, which may include regulatory approaches or nonregulatory approaches, will be determined by the Partners through the Partner Workshops.

- The LID standards in the stormwater manual should allow flexibility.
- If the standards are not mandatory, this could create conflict between towns.
- If percent impervious coverage of a watershed is regulated, there should be flexibility at the local level to decide where those impervious surfaces are located within the watershed.
- Standards should be defined, but use of LID on a specific site should be voluntary.
- Uniformity across communities in Connecticut is valuable and desirable.

EXPLORING ALTERNATIVES—CAFE WORKSHOP

Jim introduced the café workshop with a PowerPoint presentation. The purpose of the workshop was to:

- Examine ideas about how alternatives work together
- Have an open dialog about alternatives
- Leverage collective knowledge
- Elicit innovation and good decision making

Photograph 1—Café workshop in process.

The café workshop included the following steps:

- Split into groups (about 4 to 6 people per group) and pick a "reporter."
- Open café i.e., discussion about alternatives (20 minutes).
- Document results (10 minutes).
- Reporter presents findings and notes any new alternatives (2 minutes for each reporter).

Setup of each café workshop station (i.e., table) is diagramed in *figure 1* (right) and included multicolor markers, a paper "table cloth" for brainstorming and documentation, six seats.

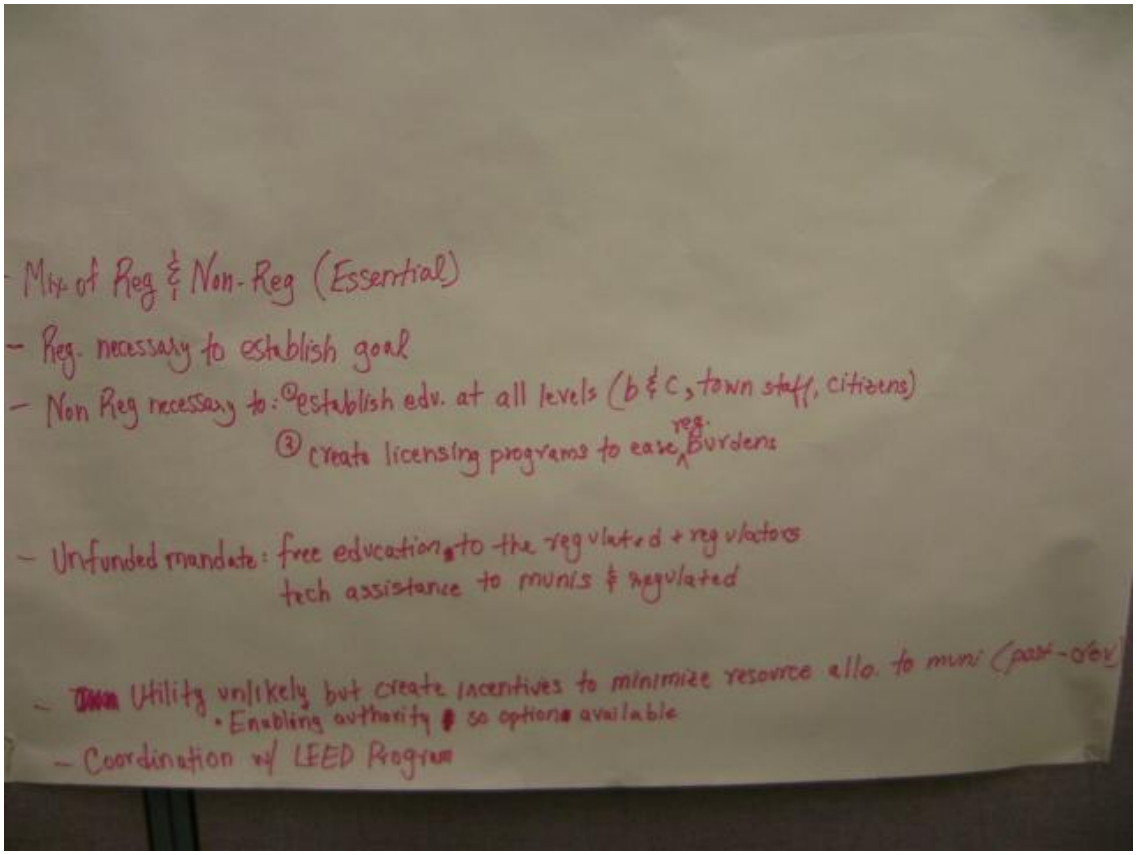
At the end of the café workshop, reporters reported results by group.[1] The

[1] Groups were not actually named or numbered during the exercise. Group numbers are provided in this summary for the sole purpose of

written results on each "table cloth" are provided below:

Group 1

- Mix of reg & non-reg (essential)
    - Reg. necessary to establish goal
    - Non-reg necessary to establish education at all levels (b& c, town staff, citizens) and to create licensing programs to ease regulatory burdens
    - Unfunded mandate – free education to the regulated and regulators; tech assistance to municipalities and regulated
- Utility [politically] unlikely; but [would] create incentives to minimize resource allo[cation] to municipalities (post-development)
    - [Adopt] enabling authority so [that the utility] option [is] available
- Coordination with LEED program.



Group 2

- Hybrid of Incentives
- Designer License – Not appropriate at this point
- Cap & Trade - Not ready yet
- Update Manual – Needs to be site specific
- SGP – Include guide as reference

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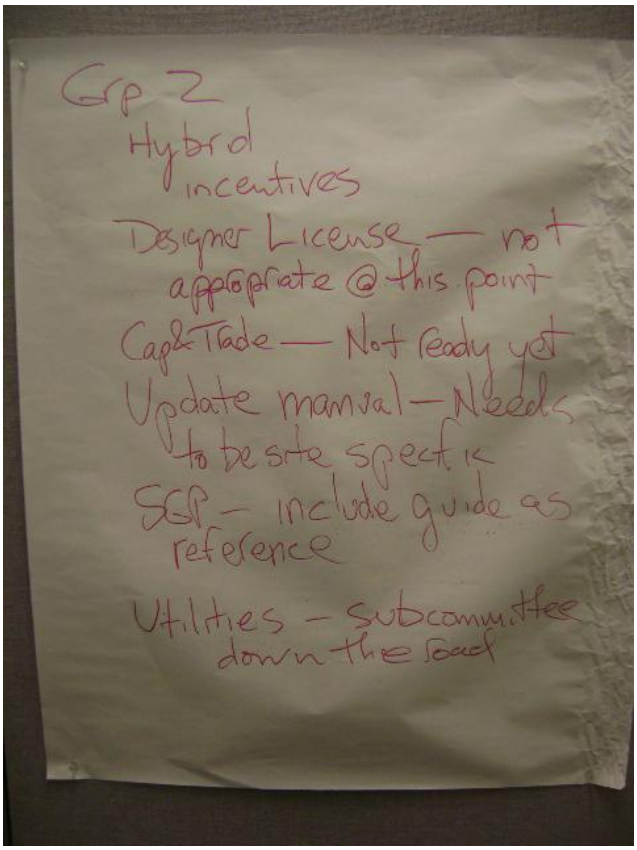
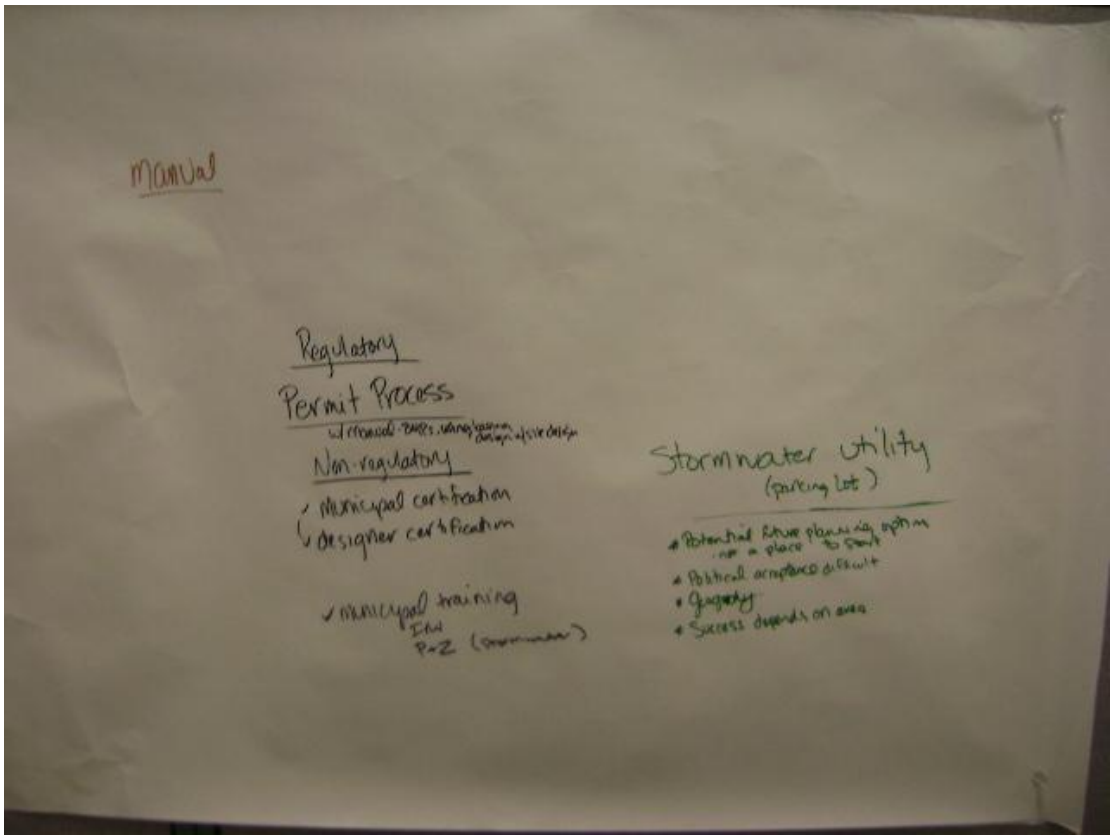
differentiating the reports from each group.

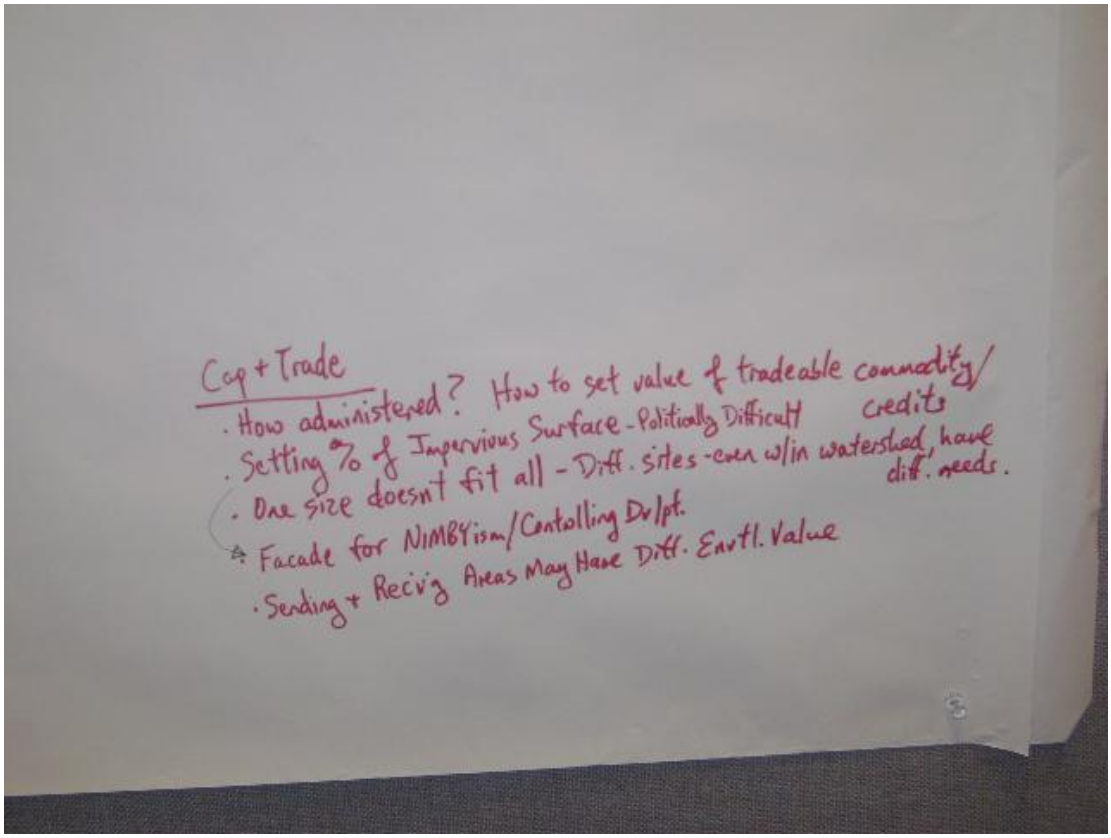
- Utilities – subcommittee down the road



Group 3

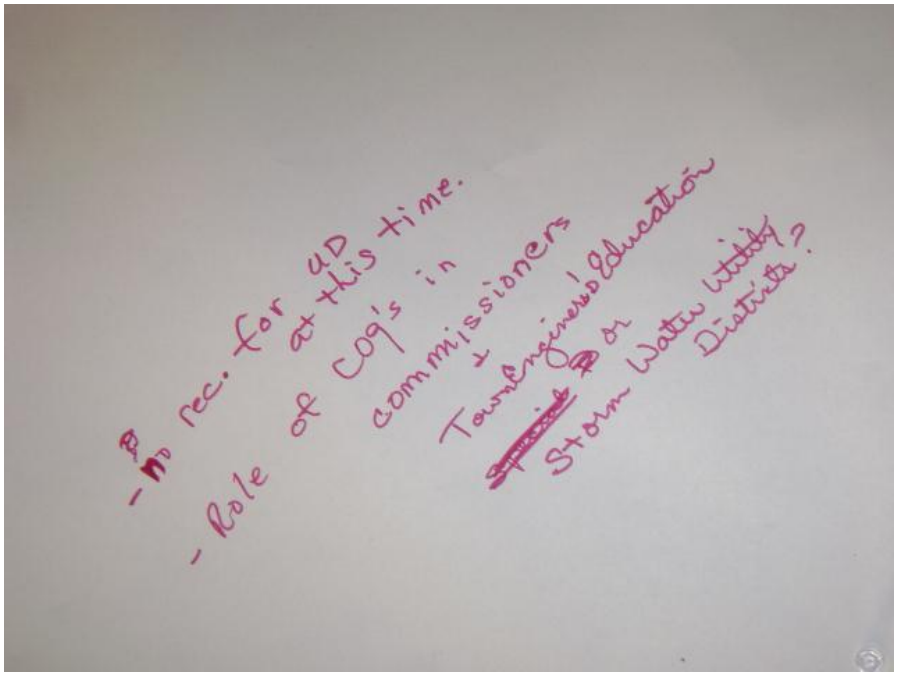
- Regulatory Permit Process – with manual – BMPs, leaving design with site design
- Non-regulatory
  - Municipal certification and designer certification
  - Municipal training (I/W [inland wetlands] and P&Z [planning and zoning]-stormwater)
- Stormwater Utility (Parking Lot)
  - Potential future planning option – not a place to start
  - Political acceptance difficult
  - Geography
  - Success depends on area
  - ??
- Cap & Trade
  - How administered? How to set value of tradeable commodity/credits
  - Setting % of impervious surface – politically difficult
  - One size doesn't fit all – diff. sites even within watershed, have diff. needs
  - Façade for NIMBYism/controlling development.
  - Sending and receiving areas may have different environmental value

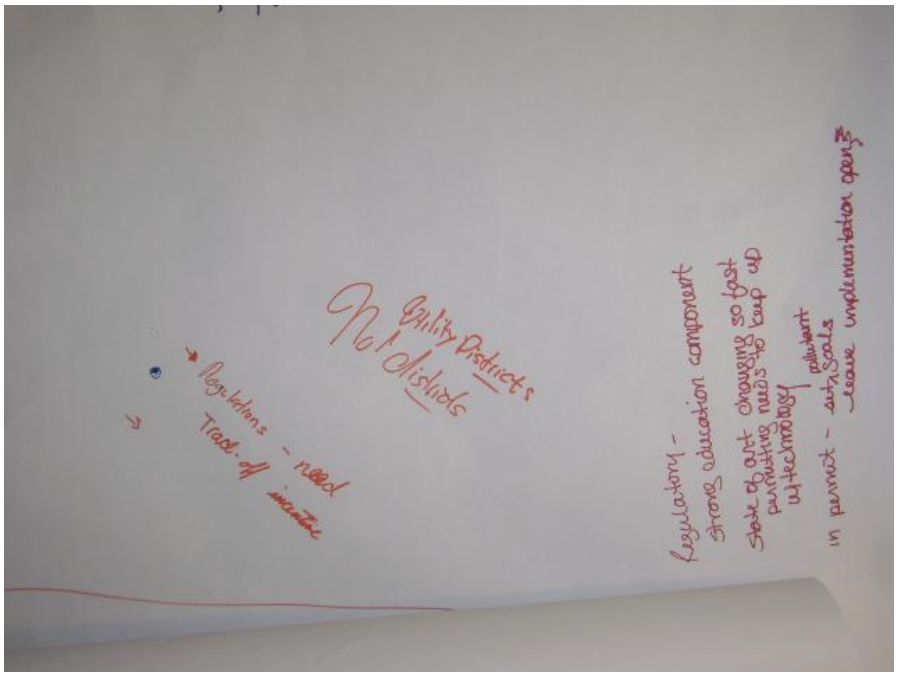

Manual
Regulatory
Permit Process
Non-regulatory
Municipal certification
Designer certification
Municipal training
Stormwater utility
(parking lot)
Political acceptance difficult

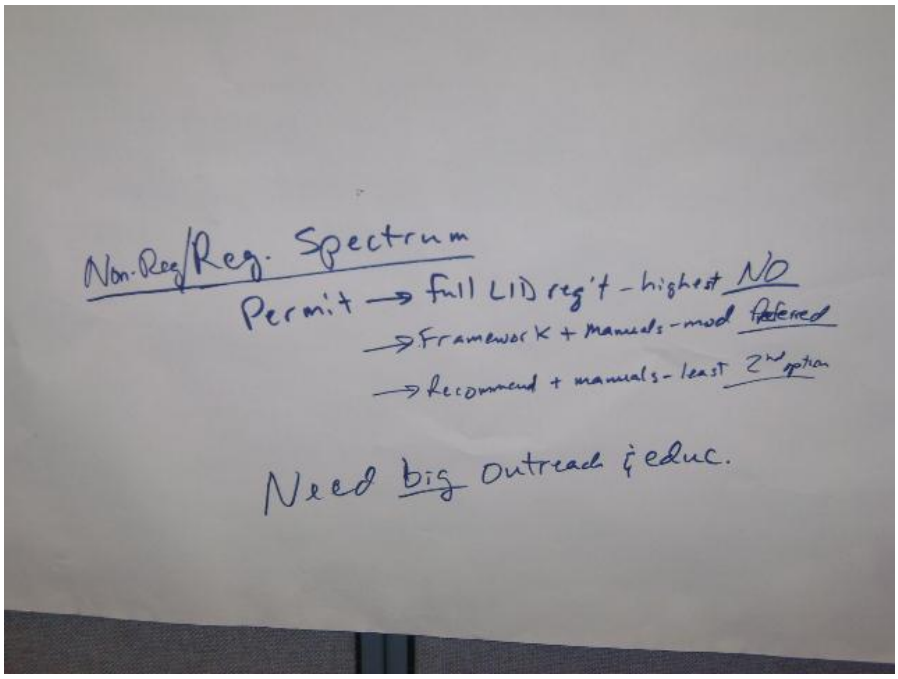

Cap + Trade
. How administered? How to set value of tradeable commodity/ credits
. Setting % of Impervious Surface - Politically Difficult
. One size doesn't fit all - Diff. sites - even w/in watershed, have diff. needs.
. Facade for NIMBYism/Controlling Dvlpt.
. Sending + Reciv Areas May Have Diff. Envtl. Value

Group 4

- No rec. for UD at this time.
- Role of COG's in commissioners and town engineers' education or storm water utility districts?
- Regulatory – strong education component
- State of art changing so fast permitting needs to keep up with technology
- In permit – set pollutant goals and leave implementation open
- No utility districts
- Regulations need trade-off incentive
- Non Reg/reg spectrum
    - Permit – full LID requirement – Highest <u>NO</u>
    - Framework and manuals – mod <u>Preferred</u>
    - Recommend and manuals – least <u>2nd option</u>
- Need <u>big</u> outreach and education



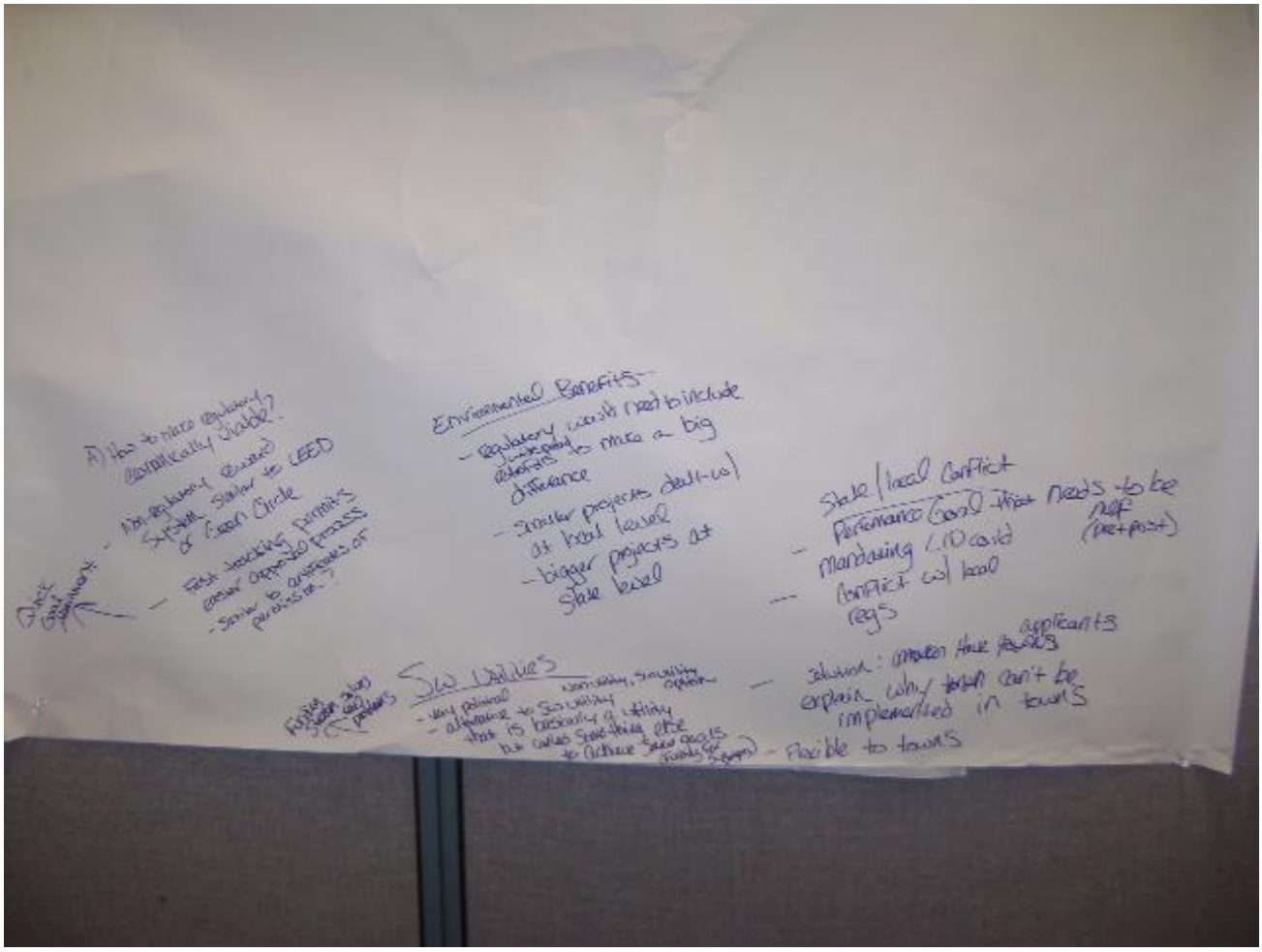




Group 5

- How to make regulatory economically viable?
  - Non-regulatory reward system similar to LEED or Green Circle
  - Fast tracking permits easier approval process (quick goal attainment)
  - Similar to certificates of permission?
- Environmental Benefits

    - Regulatory would need to include widespread retrofits to make a big difference
    - Smaller projects dealt with at local level
    - Bigger projects at state level
- State/local conflict
    - Performance goal that needs to be met (pre & post)
    - Mandating LID could conflict with local regs
    - Solution: Have applicants explain why can't be implemented in towns.
- SW Utilities
    - Very political
    - Non-utility, stormwater utility option
    - Alternative to stormwater utility that is basically a utility but called something else to achieve same goals (funding for stormwater projects)
    - Funding stream solves real problems.
    - Flexible to towns



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IDENTIFYING PREFERRED ALTERNATIVES BASED ON CRITERIA—DOT VOTING USING A CRITERIA MATRIX

Jim gave a PowerPoint presentation introducing the dot-voting workshop using a criteria matrix. The purpose of the dot-voting workshop was to:

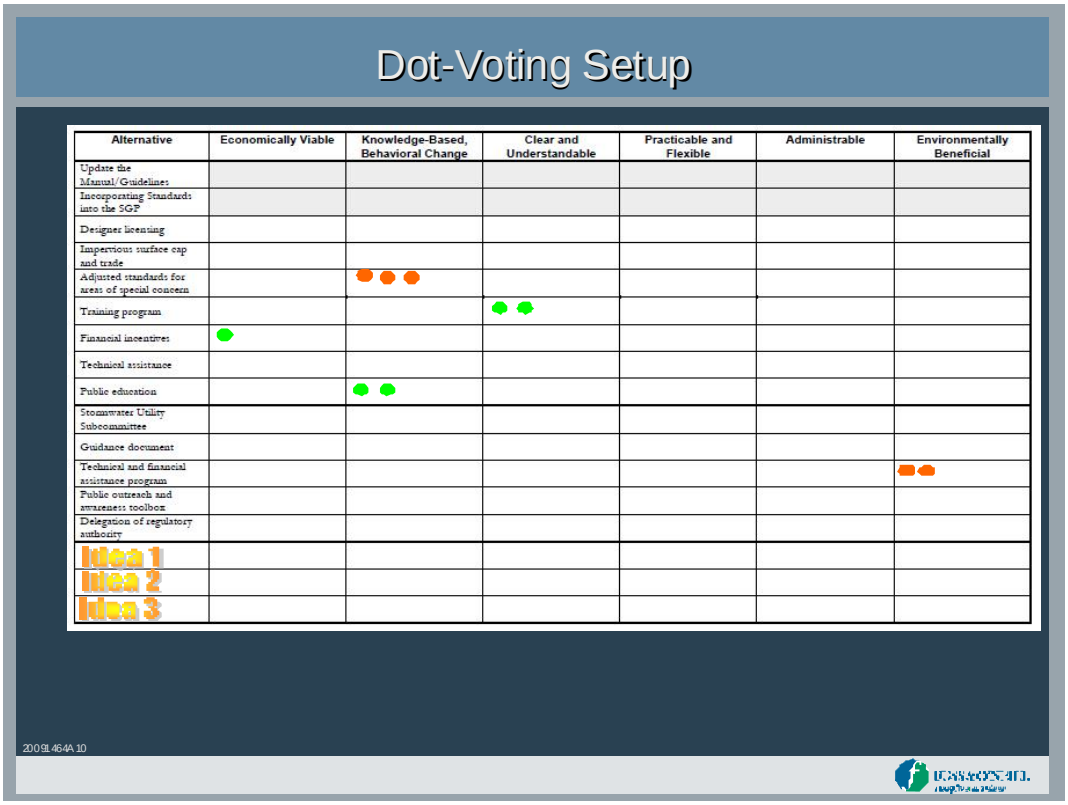
- Identify alternatives for immediate development
- Determine how alternatives compare with criteria
- Determine how alternatives fit best together when considering criteria

Photograph 2—Dot-voting workshop in process.

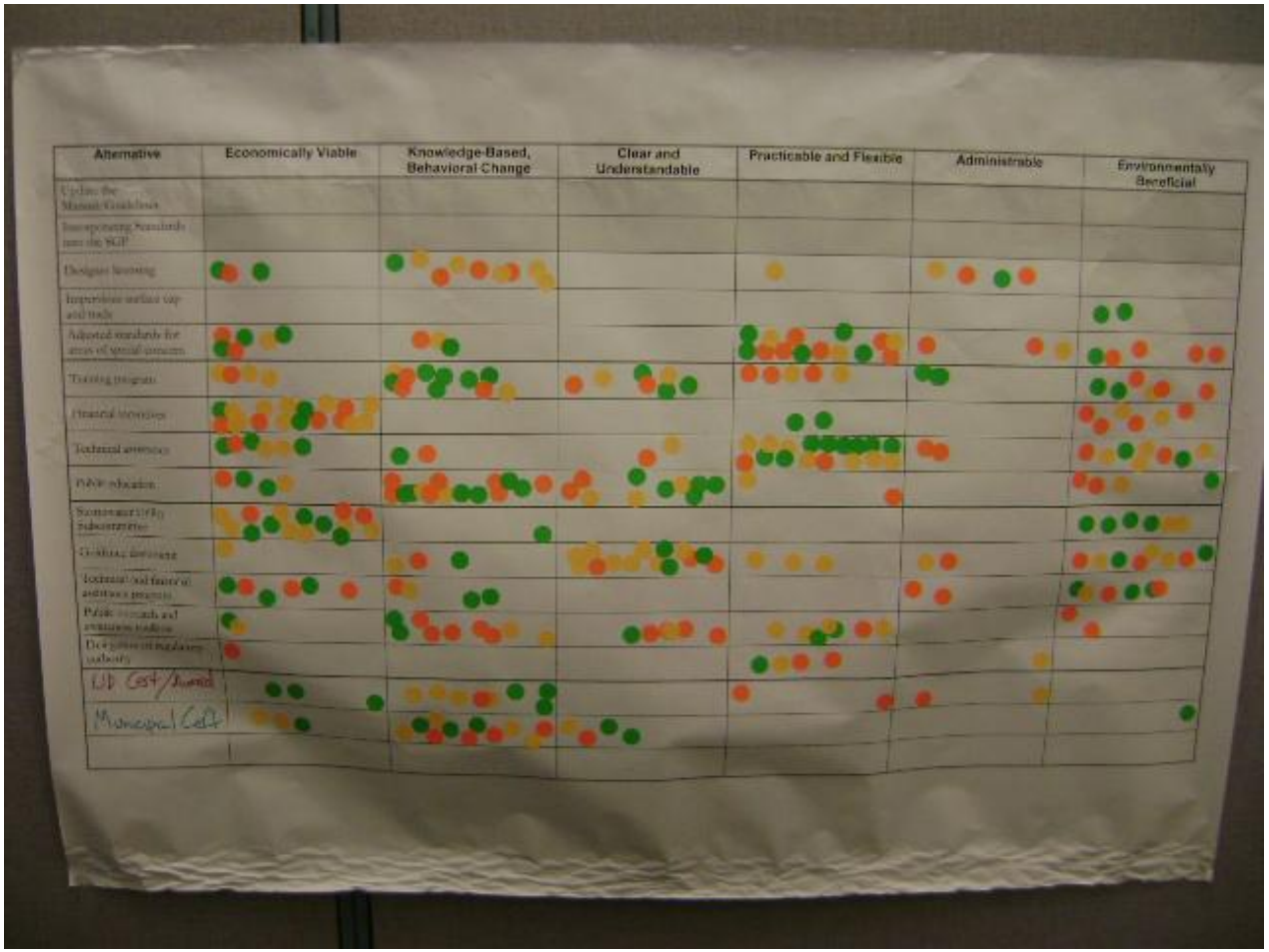
Dot voting included the following steps:

- Participants were each given 15 dots.
- Participants then identified which alternatives should be implemented first and which criteria they match by placing dots (5 minutes).
- Discuss results (10 minutes).

Dots were placed on a large paper sheet, which was set up as follows with alternatives on the vertical axis and criteria on the horizontal axis:



The results of the dot voting are shown below:



Tally of the dot votes by alternative and criteria is as follows:

Tally from Dot Voting

Alternative	Economically Viable	Knowledge-Based, Behavioral Change	Clear and Understandable	Practicable and Flexible	Administrable	Environmentally Beneficial	
Update the Manual/Guidelines							
Incorporating Standards into the SGP							
Designer licensing	3	9		1	4		17
Impervious surface cap and trade						2	2
Adjusted standards for areas of special concern	6	3		14	3	5	31
Training program	4	11	7	5	2	6	35
Financial incentives	18			2		6	26
Technical assistance	6	2	2	17	2	8	37
Public education	4	15	10	2		4	35
Stormwater Utility Subcommittee	15	1				6	22
Guidance document	1	3	14	3	2	8	31
Technical and financial assistance program	6	4			2	6	18
Public outreach and awareness toolbox	2	9	6	7		2	26
Delegation of regulatory authority	1			4	1		6
LID Cert./Award	3	8		2	2		15
Municipal Cert.	3	11	4			1	19
	72	76	43	57	18	54	

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NEXT STEPS

The next workshop will be held on October 20 in the Phoenix Auditorium from 9:15 to 11:45 a.m. This meeting will focus on LID standards and development of a LID guidance. In preparation for the meeting Fuss & O'Neill will develop a technical memorandum regarding alternatives for LID implementation and selection based on workshops 1 - 3. Fuss & O'Neill will also develop a summary document of LID standards.

ATTENDEES

Attendees of the August 31 workshop are listed below in alphabetical order by affiliation.

Attendee	Affiliation
John Pagini	CCAPA [Connecticut Chapter of the American Planning Association]
Matthew Hallssey	Connecticut Construction Industries
Jessica Morgan	Connecticut Department of Environmental Protection
Mary-Beth Hart	Connecticut Department of Environmental Protection OLISP
Chris Malik	Connecticut Department of Environmental Protection/NPS Program
MaryAnn Nusom Haverstock	Connecticut Department of Environmental Protection/NPS Program
Rob Hust	Connecticut Department of Environmental Protection-Water & Permitting
Chris Stone	Connecticut Department of Environmental Protection-Water Permitting
Nisha Patel	Connecticut Department of Environmental Protection-Water Permitting
Eric McPhee	Connecticut Department of Public Health
Paul Corrente	Connecticut Department of Transportation—Environmental Planning
John Carrier	Connecticut Home Builders
Virginia Mason	Council of Governments Central Naugatuck Valley
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