-----Original Message-----
From: Scott F. Moorehead [mailto:scott.sfmeng@snet.net]
Sent: Tuesday, May 26, 2009 9:06 AM
To: rwarren@ribuilders.org; Russ Chateauneuf
Cc: Jean SFM Office; isds@cox.net; jfrisella@frisella.com; clasar2@cox.net; Scott@nrswetlands.com; stasiunas@verizon.net; dickinson@riconnect.com; michaelartesani@cox.net; jcc@netsense.net; bfaneuf@ecosystem-solutions.com
Subject: Re: Storm Water Management meeting - May 26,2009

Roger and Russ

In case I can't make it this afternoon, I wanted to give you a few general comments and observations about the new manual. I will have a number of more technical comments but will save those for the workshop.

1. I presume that since the manual is complete we will have little likelihood of effecting any significant changes.

2. There is an informational workshop on June 4. Will there be a public hearing on this manual? It is in effect a Regulation as it is an implementation of a public law.

3. My biggest concern is the mandatory requirement to use Low Impact Development as the primary method where possible. This is a back handed way to regulate land development practice. It appears this will mandate us to design cluster and conservation developments where allowed by local ordinance even when conventional subdivisions are allowed. It appears the Legislature is taking an indirect approach to effectuate land development policy that many Towns have been reluctant to implement.

4. When will this manual be effective and how will that impact developments that are already in the design process? Will this require subdivisions that already have Master Plan approval to be redesigned to incorporate LID if they don't already have DEM permits?

5. Some of the drainage techniques preferred in this manual are ones that some municipalities reject. How do we "prove" these are not feasible when it is based on the Town staff or board bias rather than a codified ordinance?

6. Most of the Towns I deal with have little or no provision for LID or conservation development. That will put us between the proverbial rock and a hard place as we try to permit these developments.

7. Engineering costs will be going up. Inspection costs to insure that the drainage facilities are constructed according to plan will be going up.

8. Most Towns will not accept the required maintenance responsibilities for many of these drainage systems so the maintenance burden and cost will fall on the prospective homeowners. Based on my experience, long term maintenance will be a big problem.

9. How will we deal with the subjective review of whether we have maximized LID design techniques? LID conflicts with how people want to use their land. The house and yard can always be smaller.
Will DEM be micromanaging our designs, telling us to reduce the limits of disturbance?

10. When we design subdivisions, we do not usually know what house will be constructed on a lot and what amenities the home owner will want. Will the permit conditions for drainage become so constraining that it will limit flexibility of design and the rights of homeowners to use their lots?

I'm sure I will have many more comments but I have only had time to do a cursory review of the manual and appendix.

Scott F. Moorehead
SFM Engineering Assoc.
410 Tiogue Avenue
Coventry, RI 02816
phone 401-826-3736
fax 401-826-1711

Original Message-----
From: Matthew Foley [mailto:Matthew.Foley@unilock.com]
Sent: Monday, June 08, 2009 2:51 PM
To: Russ Chateauneuf
Subject: Stormwater Design Manual

Hello Russ,

My name is Matt Foley. I am a resident of Narragansett and employed by Unilock, a manufacturer of permeable concrete unit pavers. I unfortunately could not make last week's URI session on the manual, however I spoke with Rich Claytor and he suggested I write to you.

After reviewing section 5.4 on permeable paving, I have several concerns that I would like addressed. My comments are below. In addition, the extensive data in figure 5-11 on porous asphalt supplied by UNH is good. This coming fall we will contribute permeable pavers to their monitoring site. Other studies across the country have provided extensive data similar for PICP (permeable interlocking concrete pavers) and I would like to see if there will be an opportunity to add that data in an additional figure 5-12. The amount of attention this draft places on porous asphalt is a bit unbalanced on the three porous options. I would like to share with you manuals for other states adopting LID and their approach to this topic.

I look forward to your response and potential course of action on my part. For your review, I have attached a new environmental brochure on PICP. Let me know if I can stop by your office to discuss further.

Thanks,

-Matt

5.4 Permeable Paving

Permeable paving practices capture and temporarily store the WQ_v before allowing it to infiltrate into the soil or conveying it to another stormwater practice. There are three major types of permeable paving:

• Porous asphalt and pervious concrete. Although they appear to be the same as traditional asphalt or concrete pavement, they are mixed with a very low content of fine sand, so that they have 10%-25% void space and a runoff coefficient that is almost zero. Required construction specifications for porous asphalt and pervious concrete are located in Appendix F.

• Paving stones (also known as unit pavers) are impermeable blocks made of brick, stone, or concrete, set on a prepared sand base. The joints between the blocks are filled with sand or stone dust to allow water to percolate to the subsurface. Runoff coefficients range from 0.1 – 0.7, depending on rainfall intensity, joint width, and materials. Some concrete paving stones have an open cell design to increase permeability.

Sand as a base and infill material is never used. Never stone dust anywhere. The base, bedding layer and infill are specific gradations of open-graded aggregates. The 0.1-0.7 coefficient is too broad of a range and requires clarification.

• Grass pavers (also known as turf blocks) are a type of open-cell unit paver in which

the cells are filled with soil and planted with turf. The pavers, made of concrete or synthetic material, distribute the weight of traffic and prevent compression of the underlying soil. Runoff coefficients are similar to grass, 0.15 to 0.6.
Each of these products is constructed over a base course that doubles as a reservoir for the stormwater before it infiltrates into the subsoil.

5.4.1 Feasibility

• This practice is not appropriate for high traffic/high speed areas, due to load bearing limitations and clogging potential (≥ 1,000 vehicle trips/day).
PICP has virtually no load bearing limitations and is used in industrial applications worldwide.
It also is the only porous system where restoring permeability is a reality by vacuuming.

Thanks,

-Matt

Matthew Foley
Commercial Sales
Unilock of New England
35 Commerce Dr
Uxbridge, MA 01569
1-800-UNILOCK
Office: 508-278-4536 ext. 500| Fax: 508-278-4572 | Cell: 401-255-1704
matt.foley@unilock.com

Hi Stormwater Team –

I suggest correcting page B-3 in the Appendices, as there is no Soil-Testing Laboratory at the University of Rhode Island anymore. We (at the URI Outreach Center, 3 East Alumni Avenue, Kingston, RI 02881 or 401-874-2900) can handle delivered or mailed samples, but we actually send them to UMASS Amherst for analysis.

Thanks,

Kate Venturini

Kate E. Venturini

Manager
URI / CRMC Coastal Landscapes Program

URI College of the Environment and Life Sciences
Kathleen M. Mallon Outreach Center
3 East Alumni Avenue
Kingston, RI 02881

p: 401-874-4096
f: 401-874-2259
kate@uri.edu
www.uri.edu/cels/ceoc

"Be the change that you want to see in the world" - Gandhi

Thanks for the opportunity to review the draft manual.

Under Minimum Standard 7: Pollution Prevention (page 3-5), please consider mentioning the need to file a Notice of Intent for coverage under the RIPDES Construction General Permit if an area of 1+acres is to be disturbed, with reference to the GP for contents of a stormwater pollution prevention plan.
If you do not feel it is appropriate to mention in Chapter 3, perhaps a note in Appendix G would suffice.

Sincerely,
Kristine A. Stuart
Stormwater Specialist
Southern RI Conservation District

COMMITMENT & INTEGRITY
DRIVE RESULTS

95 Cedar Street | Suite 100
Providence, Rhode Island 02903
www.woodardcurran.com

T 800.985.7897
T 401.273.1007
F 401.273.5087

WOODARD &CURRAN

June 26, 2009

Mr. Russ Chateauneuf, P.E.
Department of Environmental Management
Office of Water Resources
235 Promenade Street
Providence, RI 02908-5767

Mr. Jim Boyd
Coastal Resources Management Council
Stedman Government Center
Tower Hill Road
Wakefield, RI 02879

Re: Rhode Island Stormwater Design and Installation Standards Manual
Draft Comments

Dear Messieurs Chateauneuf and Boyd:

Woodard & Curran appreciated the opportunity to attend the informational session on June 4, 2009 for the introduction of the Draft Stormwater Design and Installation Standards Manual. We found the session to be informative and provided an excellent overview of the proposed changes. We have since reviewed the draft document and offer the following comments for your consideration. Comments are listed below by Section number for your convenient reference.

Section 1.2 – Applicability of the Manual

Please clarify the applicability of the manual regarding when and by whom are designers required to adhere to the standards. Do the standards only applying when permitting through CRMC, DEM or when directed by another permitting authority?

Section 3.2.3 – Minimum Standard 3: Water Quality

The water quality volume referenced here and in the glossary is specified as one inch of runoff from impervious surfaces without regard to whether the impervious surface is a roadway or a roof. While studies have shown that the first inch of runoff is a good representation of the water quality volume for a roadway system, a much smaller volume of water is required to capture the water quality runoff from a roof system. The manual should reflect this difference and define the water quality volume from roof runoff to be something on the order of ¼ inch.

The prescriptive standard of treating one inch of precipitation in a properly designed Best Management Practices (BMP) was established based on analyses performed using an urban runoff model for the Nationwide Urban Runoff Program's NURP 50 particle size distribution, which is typical of highway runoff. The NURP 50 particle size distribution is such that 50% of the particles are retained on the No. 20 sieve and all particles are retained on the No. 200 sieve. It is not characteristic of roof runoff, which typically contains particles in the silt and clay-size range.

Literature consistently reports that the majority of contaminants present in roof runoff are removed within the first 0.10 inch or less of rainfall. A study conducted in 2003 by P.C. Van Metre and B.J.

Mahler entitled "The Contribution of Particles Washed from Rooftops to Contaminant Loading to Urban Streams" found there was no difference in suspended sediment concentrations between asphalt and metal rooftop types, and that typically less than 5 percent sand-sized particles were present in the first flush and composite (event-mean) samples. The Van Metre and Mahler study concluded that the great majority of particles that are easily mobilized and washed off rooftops during rainfall are removed by the first 2.6 mm (0.1 inch) of rain or less. Similar results were reported by Forster in 1996 and 1999, and Mason, Ammann, Ulrich, and Sigg in 1999. Therefore, based on the above referenced studies, defining the water quality volume from roof runoff as ¼-inch of depth would provide greater than 80% solids capture of roof runoff. This is superior to the 80% of solids captured within the 1-inch depth of water quality volume for roadway runoff that was measured by the model used to set this standard.

Section 3.2.4 – Minimum Standard 4: Conveyance and Natural Channel Protection

This Section excludes the use of the Rational Method to estimate the peak discharge rate for conveyance systems. Utilizing the Rational Method for pipe conveyance design is a standard engineering practice and provides reliable results when applied to small, developed watersheds and particularly to roadway drainage design. The engineer should be able to decide which method to employ based on project conditions. Why has it been excluded? We understand your rationale for not using the Rational Method for determining the water quality volume, however, the same reasoning does not apply to conveyance systems for larger storm events.

Section 4.6.1.1 – Minimum Criteria for Stormwater Credit

All soil suitability testing and evaluation should be allowed to be conducted by a professional engineer. Several sections of the document are inconsistent as to the requirements of the professional conducting soil evaluations and testing. This Section requires a Soil Evaluator to confirm depth to groundwater for HSG "A" and "B" soils, but requires a Registered Professional Engineer to evaluate water table depth for HSG "C" soils. Section 5.3.1 states that soil testing must be conducted by a Soil Evaluator or a P.E., however, Appendix H states that all testing shall be completed by a Soil Evaluator. Both soil evaluators and civil engineers are educated in soil properties, however, in-place permeability testing is typically performed under the direction of a geotechnical engineer.

Section 5.4 – Permeable Paving

The multilayer system that is required by this section and Appendix F for porous asphalt is not necessary for many applications. The designer should be allowed to design the system based on site specific conditions. Many of the pavement systems installed in conjunction with the UNH Stormwater Center have been successfully operating with a more simplified cross section – for example, without a choker course, with a combination filter and reservoir course, or other more simplified designs. If the calculations supporting the porous pavement system design demonstrate that it will operate effectively, the Owner of a porous pavement system should not be required to spend additional funds to install the more complex system prescribed by Appendix F.

Section 5.5 – Pollutant Removal

Table 5-7 does not include pollutant removal efficiencies associated with Water Quality BMPs for bacteria. How do RIDEM and CRMC evaluate the capability of each BMP option to achieve the required 90% reduction requirement for bacteria per Minimum Standard 3?

WOODARD &CURRAN

Section 5.8.5 – Step 5 – Pollutant Removal

We noticed that the pollutant removal efficiency for bacteria was not addressed in Table 5-7 although 90% removal of bacteria is required. Why is bacteria not addressed in this matrix?

General Comment

We expect that many questions will arise as we apply the design steps to a particular project. Will RIDEM have a Help Center focused on assisting designers when this manual first becomes effective?

In Summary, we find the manual to be comprehensive. The project examples in the Appendices will help reduce the learning curve for stormwater designers and engineers. We congratulate you on the organization and presentation of the manual.

If you would like to discuss any of our comments, please feel free to call either of the undersigned at (401)-273-1007. Also, we are interesting in participating as a representative from the engineering community in the proposed stakeholder review committee as mentioned in the information session.

Sincerely,

WOODARD & CURRAN INC.

Janice M. Greenwood, P.E.
Vice President

Jeffery C. Stearns, P.E.
Project Manager

JMG/jmm

200 Enterprise Drive
Scarborough, ME 04074
Phone: (877) 907-8676
Toll Free: (207) 885-6174
www.contech-cpi.com

June 26, 2009

Russ Chateauneuf
RIDEM
Office of Water Resources
235 Promenade Street
Providence, RI 02908

RE: RI Draft Stormwater Design and Installation Standards Manual

Mr. Chateauneuf,
Thank you for the opportunity to comment on the Rhode Island Draft Stormwater Design and Installation Standards Manual. We would like to applaud the Rhode Island Department of Environmental Management (RIDEM) and Rhode Island Coastal Resources Management Council (RICRMC) for working to develop a progressive manual that advances the science of stormwater management. However, we feel there are a number opportunities to revise the manual for the better. We have compiled comments that we ask you to carefully consider in developing the final manual.

- **Minimum Standard 3-** We agree and commend your decision to move beyond "80% TSS" in establishing water quality criteria, but we question the ability of BMPs to consistently meet the specified performance criteria. In particular we question the presumption of 90% bacteria and 30% nitrogen removal given that available data indicates performance for these constituents varies considerably for most BMPs. If a presumption of performance is going to be granted we feel it is important that the standard reflect a level of performance that is consistently achieved across a wide range of sites. In our opinion existing data does not support the presumption that the BMPs currently in the manual will consistently achieve 90% bacteria removal and to a lesser extent 30% total nitrogen removal. Since additional BMPs will only be accepted if they demonstrate performance in a robust field trial it is important that performance presumptions reflect the results of equally robust studies. We recommend that the bacteria and nitrogen standards be revisited to ensure they will be consistently met given the available data for the BMPs assumed to comply.

- **Chapter 5, Infiltration Practices-** Underground infiltration systems are more difficult to access for maintenance, so we recommend that pretreatment be provided for 100% of the WQv regardless of the infiltration rate of underlying soils when underground infiltration systems are utilized

- **Chapter 5-** Suggest removing the "x's" from the boxes on the various BMP summary sheets since they are easily confused with an acceptance

- **Page 5-27-** There is no mention of proprietary devices as an acceptable pretreatment option. Many proprietary systems such as hydrodynamic separators are ideally suited for pretreatment applications. We recommend making "approved proprietary devices designed to treat 100% of the WQv" an acceptable pretreatment option considered equivalent to a forebay.

- **Section 5.5.3**- We recommend making "approved proprietary devices designed to treat 100% of the WQv" an acceptable pretreatment option considered equivalent to a forebay.

- **Page 5-68**- The table at the top of the page assigns a 25% TSS credit to hydrodynamic devices based on the results of testing at the UNHSC. It is not appropriate to assign a number to all hydrodynamic

CONTECH CONSTRUCTION PRODUCTS INC.

200 Enterprise Drive
Scarborough, ME 04074
Phone: (877) 907-8676
Toll Free: (207) 885-6174
www.contech-cpi.com

separators based on the results of testing a small number of devices at a single location. Like all BMPs hydrodynamic separator performance is variable depending on site conditions, sizing and numerous other variables. We suggest that a note be added to this table which indicates hydrodynamic separators will receive 25% TSS credit unless field testing demonstrates an alternate rating is more appropriate.

- **Section 6.1**- At the bottom of the second paragraph it states that proprietary device design criteria should be obtained from the vendor. It is critical that non proprietary design criteria be put in place to avoid the downward spiral that occurs when vendors are given free reign over sizing and are tasked with competing with other vendors. The end result is typically aggressively/undersized devices that provide less water quality protection. We recommend that specific language be developed regarding proprietary device design. Most proprietary devices are flow through systems making performance largely a function of operating rate. Design criteria should clearly state that the water quality flow (WQf) must be treated at an operating rate that does not exceed what was tested during performance evaluation. For example you might say device "x" is approved to treat the water quality flow at a maximum operating rate of "y" based on test results.

- **Section 6.5**- We suggest providing additional explanation of what is meant by catch basin to manhole configuration and catch basin to catch basin configuration to avoid misinterpretation

- **Section 6.6**- This section over simplifies the many types of proprietary devices now commercially available. At a minimum, separate categories should be created for hydrodynamic separators, media filters and catch basin inserts given that they represent unique classes of BMPs with drastically different performance expectations

- **TAP General**- It is disappointing that the TAP was developed and subsequently included in the manual without input from critical stakeholders, namely BMP manufacturers. Additionally, the TAP in its current form lacks many of the critical details needed to successfully execute a study. We fail to see how the TAP improves upon existing protocols such as TARP, TAPE, or ETV. While we applaud and agree with your decision to require robust BMP evaluations we question why Rhode Island (RI) opted not to utilize a protocol such as the TARP or TAPE which were developed with input from diverse stakeholder groups and have been successfully executed in the field. Offering reciprocity for studies completed using the TARP or TAPE protocols is likely a better solution for RI. BMP manufacturers bear the full cost of field studies and can't afford to execute a separate field study in each state. Given the limited opportunities for BMP manufacturers in RI and the crude nature of the TAP most manufacturers are unlikely to participate in a field monitoring study that is only applicable to RI. We strongly suggest accepting studies conducted per the TARP, TAPE or ETV protocols as long as BMP performance meets RI's stormwater quality criteria. If there are specific provisions of these protocols RI feels are missing they can easily be listed as mandatory amendments. If RI opts to move forward with the TAP then a stakeholder group should be convened to revise and finalize the protocol.

- **Appendix J**- The opening paragraph states that practices must undergo a 3rd party evaluation before being used for primary or pretreatment applications. However, section 6.6 states that proprietary devices may be used for pretreatment without mention of any prerequisite testing criteria. The inconsistencies between these two sections should be addressed and the policy with regard to use of proprietary devices must be clearly defined in the manual.

CONTECH CONSTRUCTION PRODUCTS INC.

200 Enterprise Drive
Scarborough, ME 04074
Phone: (877) 907-8676
Toll Free: (207) 885-6174
www.contech-cpi.com

- Who will be responsible for reviewing and administering approvals for BMPs tested per the TAP protocol? Language should be added to the manual to clarify how the process is expected to work and what manufacturers can expect should they choose to participate.

- **Appendix J- J-2-** The list of abbreviations contains numerous terms that do not appear in the TAP. The list should be refined to only include relevant terminology

- **Page J-3-** The language in the first paragraph says to see appendix H for the TAP. Change to J or remove since the language appears in the appendix it intends to reference

- Please clarify the difference between pretreatment and secondary treatment designations

- **Page J-3-** The last paragraph states that the statistics review was adopted from a guidance document from EPA and ASCE. Where is the statistics review mentioned in the TAP?? We did not see any language on required statistical analysis in the TAP

- **Page J-3-** The last paragraph states that TAP addresses the shortcomings of the TARP. What short comings have been identified with the TARP and how are they addressed? The language also states shortcomings have prevented implementation of the TARP, but many studies are currently underway per the TARP suggesting this statement is not an accurate reflection of the TARP

- **Page J-3-** It is stated that devices not considered suitable for primary treatment will be considered pretreatment. However, there is wide range of technologies with different performance capabilities that could be classified as pretreatment. There should be a process in place to assign a specific level of expected performance to pretreatment technologies to distinguish them from less effective technologies. For example a pretreatment device that gets 70% TSS, 70% Bacteria, 30% TP and 25% TN should be distinguished from a device that only gets 25% TSS credit.

- Several sections of the TAP recommend field testing BMPs in a parallel configuration. We agree that testing BMPs in parallel allows for direct comparison of the results, but this is an unrealistic expectation since the vast majority of field tests are executed on sites without parallel treatment devices.

- **Page J-4-** Says the TAP can also be used to evaluate public domain BMPs. We encourage you to do so since the majority of studies conducted on public domain BMPs do not comply with the criteria in the TAP, TAPE, TARP, ETV or other recognized protocols. If the TAP is the standard for field studies in RI than **<u>any</u>** BMP included in the manual must undergo studies in compliance with the TAP that demonstrate all performance criteria were met. It is essential that **<u>all</u>** BMPs are held to the same standards.

- **Section J.4.1-** Criterion 1 says "remove 90% of TSS, 250 micron, and 75 micron particles." It is not clear what this means. Elsewhere in the TAP TSS is defined as particles less than 500 microns. Please clarify the TSS standard

- **Section J.4.1-** Criterion 2 requires demonstrating effluent concentrations of 10 mg/l when influent concentrations are less than 100 mg/l. This may not be feasible on many sites as evidenced by numerous studies for all types of BMPs. Consider changing effluent target to 20mg/l which available performance data indicates is consistently achievable.

CONTECH CONSTRUCTION PRODUCTS INC.

200 Enterprise Drive
Scarborough, ME 04074
Phone: (877) 907-8676
Toll Free: (207) 885-6174
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- **Section J.4.1- Criterion 3-** Very few BMPs consistently achieve 90% bacteria removal based on available research. Consider revisiting this criterion accordingly

- The pretreatment criteria in Appendix J indicate 50% TSS removal should be achieved. This is inconsistent with Chapter 6 of the manual which credits proprietary devices with 25% TSS and makes no mention of testing. Clear consistent language on this policy must be developed.

- **TAP Section J.5.7.6-** It is not appropriate to include bypass flow in the performance calculations as long as bypass does not occur for flows up to and including the water quality flow. Public domain BMPs are designed for the water quality volume and evaluated based on the water passing through the BMP not what is bypassed around treatment. Proprietary BMPs must be evaluated in the same manner. Revise accordingly

- **Tap J.5.4-** It is not realistic to only consider sites that produce sediment concentrations consistent with those published at the bottom of the page. Those numbers may represent average values, but the range of pollutant loads coming off sites varies dramatically with few sites matching an average. Acceptable ranges must be defined. It is extremely costly to execute field monitoring and it will not be feasible to continuously change locations in order to find "the perfect site"

- **TAP J.5.5**- requires a minimum of 12 storm events to be sampled in order to achieve statistical significance, but the statistical methods to be used are not specified in the TAP. It is important that data be analyzed and presented in a consistent fashion, so all required calculations and statistical analysis should be specified.

- **TAP J.5.6**- Why are storms lasting less than 1 hour excluded? This excludes high intensity events such as thunderstorms with the potential to transport significant pollutant loads.

- **TAP J.5.7.7**- Collecting 7000 liter bulk samples is not feasible for remote monitoring locations given the size of the storage container and need to transport this material to a lab. This criterion should be removed accordingly

- **Tap J.7** – Multiple references to the Pacific Northwest and Washington State. Likely the result of cutting this section directly from the TAPE. Section should be revised accordingly.

- Be aware that testing is not likely to take place in RI unless a pilot installation program is implemented. There is currently no provision for pilot installations

- Appropriate calculations should be specified in reporting criteria

- **J-9**. Several places "Ecology" appears in reference to WADOE. Correct accordingly

- **Page J-19** references a TEER which is inconsistent with the TER referenced elsewhere. Likely another paste from the TAPE

We appreciate the opportunity to comment on the proposed stormwater manual and once again ask that you give our comments careful consideration. We have conducted field testing in accordance with all of the

200 Enterprise Drive
Scarborough, ME 04074
Phone: (877) 907-8676
Toll Free: (207) 885-6174
www.contech-cpi.com

protocols currently employed in the US including TARP, TAPE, ETV and Sacramento and feel it is particularly important that the issues raised relative to the TAP protocol be addressed. It is also essential that clear policy be developed to govern proprietary BMP sizing. This should not be left to the vendors! Once you have had a chance to consider our comments I encourage you to contact me. We would be happy to discuss any of our comments in more detail and would be happy to meet with you and your staff on these issues.

Respectfully,

Derek Berg
Regional Regulatory Manager
CONTECH Stormwater Solutions
200 Enterprise Drive
Scarborough, ME 04074
Ph: 207-885-6174
E: bergdm@contech-cpi.com

Rhode Island Builders Association
Building better communities since 1945

June 30, 2009

Dr. W. Michael Sullivan, Director
RI Dept. of Environmental Management
235 Promenade Street
Providence, RI 02908-5767

Dear Dr. Sullivan:

The purpose of this letter is to serve as our request that further action on the adoption of the Rhode Island Stormwater Design and Installation Standards Manual be stayed while DEM and CRMC seek wider input from the industry practitioners who will ultimately be the users of this manual.

As you are aware Russ Chateauneuf and other members of your staff held an advance workshop at RIBA to go over the highlights of this document. Also, several RIBA members attended the June 4th workshop at URI. As far as I am aware, that is the extent of our involvement in the development of this document to date. We did have the opportunity to appoint an individual to a Storm Water Advisory Committee established to provide storm water control education to municipalities and the public.

In short, it appears that this manual is the work product of a major environmental consulting firm working with staff from DEM & CRMC. Assuming the Advisory Committee played a role, it was largely made up of representatives from various federal, state and local governmental units and advocacy groups. The industry to which it is addressed has little or no opportunity to participate in its development and slightly over thirty days to review it.

During a review session we recently conducted, a number of issues were raised that should be addressed in greater detail. For example during the June 4 workshop, it was stated that one of the major reasons for the update was that "methods and techniques have failed to protect water resource quality." Also, the "80% TSS removal requirement has not prevented resources from degrading." A number of slides from different parts of the country were shown in support of those issues.

While this presentation didn't show what was degrading here in Rhode Island, we are left to conclude that the methods and techniques required by the1992 Manual are ineffective. Along with an absence of Rhode Island examples, the presentation failed to mention that only 10% or so of Rhode Island's total housing stock has been built since 1992. Assuming a comparable change in commercial development in that period, we question why 90% of the built environment that is subject to much less storm water mitigation, if any, is not considered a factor in whatever degradation has occurred here in Rhode Island.

450 Veterans Memorial Pkwy. #301
East Providence, RI 02914-5380
401.438.7400
Fax- 401.438.7446
www.ribuilders.org

Practical application questions have been raised as well. For example:

- Their appears to be no distinction between property size and use.
- Why is a three foot separation required for runoff from a roof when less can be approved for a septic system?
- How can the "Maximum Extent Practicable" be a performance standard? What is the maximum and who determines what is practicable?
- Because infiltration is expensive, does the maximum extent practicable mean cost is no object?
- Who is going to be responsible for post construction maintenance?
- How do you prevent homeowners from filling in rain gardens and road side swales?

We are concerned that this update will be the used as a support document to require all the new technology and methods that are available rather than a document to provide specific tools that can be selected to address specific circumstances. As our members are industry professionals as well, they welcome improved tools to do their job better. However, we see the possibility that the "maximum extent practicable" will become the de facto minimum to be imposed on every project from a smallest lot to the largest subdivision. Developers will be subject to thirty nine different interpretations of the "maximum extent practicable" and whatever is in the Manual will be required to be in the ground - cost no object.

RIBA has a long history of working collaboratively with DEM on such major issues as Wetlands and OWTS regulatory changes and we are dismayed that more input wasn't sought for this issue as well. We submit that as any construction activity may occur over the near future will be subject to perfectly adequate stormwater protections, that there is no imminent need for this update at this time. This lull in the business cycle is an opportune time for DEM, CRMC and RIBA to examine this update and finds ways to ensure that it this Manual remains a resource to development rather than an impediment.

I will follow up next week to see if there is a convenient time for us meet and discuss these concerns further with you.

Sincerely,

Roger R. Warren

Cc: Russell Chateauneuf
James Boyd

DiPrete Engineering

June 30, 2009

Russell Chateauneuf, P.E.
RIDEM
Office of Water Resources
235 Promenade Street
Providence, RI 02908

RE: Draft May 2009 RI Stormwater Design and Installation Standards Manual (RISDISM) Request for Public Comment Extension

Dear Mr. Chateauneuf:

DiPrete Engineering Associates, Inc. respectfully submits a review of the DRAFT May 2009 Stormwater Design and Installation Standards Manual. Upon detailed review of the draft manual, we respectfully request an extension for public comment. There are a number of new requirements which may be difficult to implement on a site by site basis. We feel additional time of 60 days, ending on Labor Day, will allow our firm to better address the effects of the new manual and provide examples for RIDEM consideration.

Our general concerns include:

- Requirement for a 3' separation to groundwater table from the bottom of infiltration practices without allowing installation of the infiltration practices in fill.
- Commercial sites requiring ADA maximum slopes may be problematic with the requirement for 3' separation. Due to the gradual slopes these parking lots require, many sites cannot necessarily mimic the existing grade to promote maximum recharge of stormwater, especially on the smaller sites with buildings being proposed close to the street.
- 24-hour extended detention of the one-year storm event to potentially offset the peak of the receiving water body. Many cases will require larger detention basins than are currently being constructed.
- How the Construction Erosion and Sedimentation Controls will be reviewed. Will this require more extensive specifications to be followed at the construction stages? This theoretical analysis is typically omitted and addressed on site during construction with variable site conditions taken into consideration.
- Disallowance of groundwater dewatering at a site. Many sites require control of the seasonal high groundwater to reduce fill. For example, control of groundwater in the area of the road base is a practice that has been accepted and has been effective for decades.
- Residential drywells for roof leaders are set 2 to 3 feet above the groundwater table and must be in original soil. The stormwater quality is considered to be close to drinking water standards. Filtration of the discharge through natural soils is questioned. Hydraulic drainage is the primary concern. Groundwater mounding under the drywell for a 24 hour storm event will be negligible. The new requirement may restrict the use of an accepted successful practice of utilizing drywells to discharge clean stormwater from roofs.
- Stormwater quality/Impervious coverage research. Is research available to quantify the effect of urban watersheds developed with stormwater management systems similar to those required

by the 1993 RISDISM? Research that have been provided or that is found concerns urban watersheds without stormwater water quality improvements. The end of pipe analysis at drainage basins may not account for sheet flow discharge and the effect of the entire stormwater management system to the water resource.

DiPrete Engineering Associates, Inc. requests additional time to analyze a few of our engineered sites to evaluate the potential impact of the May 2009 RISDISM vs. the 1993 RISDISM as currently approved by the RIDEM. The analysis will evaluate applicability, constructability, and cost differential under the new requirements. We intend to complete this analysis over the next 60 days and would share this data with you if you are interested. A Labor Day deadline would be appreciated. We understand that you are working through a process and are likely trying to meet a deadline. If you believe a meeting on some of our concerns could save time, we would be available at your convenience. We have attached a document that generally discusses some areas of concern. The document is not intended to be objections or conclusions and is more of a random collection of our thoughts. We understand that there could be clarification provided by the DEM which could resolve some of these issues.

Thank you for your consideration.

Sincerely,
DiPrete Engineering Associates, Inc.

Christopher Duhamel, P.E.

DiPrete Engineering Associates, Inc.

Kevin DeMers, P.E.

ATTACHMENT: REFERENCE TO MAY 2009 RISDISM (DRAFT)

Section 3.2.2 Minimum Standard 2: Groundwater Recharge
"groundwater dewatering at a site is not allowed."

Does groundwater dewatering only relate to stormwater management or for OWTS & remediation/pollution control as well? This should be pointed out in the regulations.

Recommendation: We would advise against the groundwater dewatering prohibition for ALL purposes. This restriction will have potential for the most impact to site development causing road bases, drainage basins, house foundations, etc. to be elevated resulting in more fill being imported to a site.

Section 3.1 Stormwater Management Standards
Table 3-1 Design rainfall amounts for RI

100 year storm increase for design storms based on Atlas of Precipitation Extremes for the Northeastern US and Canada. NRCC release publication RR 93-5

Has the NRCC study been adopted by USDA?
This may have a significant effect. A cost benefit analysis to control the 9 inch storm over the 7 inch storm will be needed.

Section 3.2.4 Minimum Standard 4: Conveyance and Natural Channel Protection

"Protection for natural channels downstream must be supplied by providing 24-hour extended detention of the one-year, 24-hour design storm event runoff volume."

Per Section 3.3.4 Channel Protection Volume: "Detention time for the one-year storm is defined by the center of mass method." If our understanding is correct, for an existing center of mass detention basin inflow of 12.0 hours, the resulting center of mass of the outflow would be required to be 36.0 hours.(A required 24 hour offset). It is our experience that this requirement would be prohibitive to the goal of minimizing of land disturbance due to the expansiveness of the "end of pipe" detention structure. In addition, the design volume would increase linearly to accommodate the 24 hour offset in discharge (dead storage) and the availability for a 2 to 100 year storm. Concerns would also be raised for back to back storms.

We would recommend offsetting the peak design in watersheds identified as developed beyond carrying **capacity or where the receiving water courses have existing flooding problems..**

Section 3.2.10 Minimum Standard 10: Construction Erosion and Sedimentation Control

"ESC practices must meet the following minimum design criteria: temporary sediment trapping practices must be sized for 1 inch of runoff, and temporary conveyance practices must be sized to handle flow from the 10-year, 24-hour design storm."

Due to these distinct specifications, will the engineer be required to prepare a stand-alone Erosion Control Plan? Our concern is this will produce a new cost for the applicant before the engineering

design is fully vested. In addition, there are many variables that must be confronted during construction. The Contractor may meet the requirements of the soil erosion plan, but may miss the intent of overall mitigation. A conflict could develop with the contractor's obligation.

Section 5 & 7 General – Landscape Plan

From the structural practice sections in these chapters, Landscape Plans will be required for any above-ground structural practice.

This can be cost prohibitive for the applicant to produce a Landscape Plan prior to the engineering design being fully vested. Please clarify the requirements of this landscape plan: does it need a Registered Landscape Architect's stamp? Can it be conceptual in nature?

Section 4.6 LID Stormwater Credit

A. "If runoff from impervious areas are adequately directed to a QPA, the area can be deducted from total impervious area, thereby reducing the Required WQv and the size of the structural BMPs used to meet the removal requirement of Standard 3."

Does this statement entail removal of the impervious area from the WQv calculations only, or from the entire hydrology analysis for detention sizing (channel protection volume) as well? Does the regulation consider that the QPA area mitigates 100% of the stormwater runoff and can be eliminated from the site hydrology? If so, is this modeling technique consistent with TR 55?

B. *QPA not applicable for soils with a seasonal high gwt less than 18 inches. QPA applicable for sites less than 5%.*

Are there groundwater hydrology studies or empirical evidence studies that can be referenced to evaluate these parameters?

C. *The flow path through the QPA shall comply with the setbacks established for structural infiltration BMP's.*

Is the set back from the QPA outer perimeter area or from the flow path center of the area?

Section 5.3 Stormwater Infiltration Practices

Part 1: "Key consideration – Separation from groundwater table and bedrock of at least three (3) feet."

Research we have seen indicates most of the stormwater pollutant removal occurs in the first 18" of soil depth. Please clarify: is this 3' separation for water quality concerns or hydraulic concerns? Based on the new restriction of placing the bottom of infiltration practices in fill combined with this separation requirement will prevent infiltration on a large portion of our projects which are between 2'-3' depth to the groundwater table. These developments will require the traditional end of pipe detention basin designs which DEM and most developers agree are not ideal. This will be in addition to LINED water

quality practices which will add cost to the overall project. We would recommend a revision to 2' separation to groundwater table, possibly with a minimum drained impervious area (for example, 10,000 square feet) or flow rate over which 3' will be required.

For referenc, the Mass DEP Stormwater Manual has required a 2 foot separation for all infiltration practices.

Part 2: "Infiltration practices that are designed for the 10-year storm event or greater and have a separation from the bottom of the system to the seasonal high groundwater of less than four feet shall provide a groundwater mounding analysis."

Will there be a minimum drained area or flow rate for this provision as well? For a simple home drywell or driveway trench, this seems to be an excessive requirement. The soil column beneath the bottom of the infiltration structure to the groundwater elevation will be saturated during the storm event. Groundwater mounding for a 24 hour storm event may be insignificant. Is the concern the laminar horizontal or vertical groundwater flow through the soil column?

The current RIDEM accepted modeling for infiltration analysis accounts for storage vs. discharge at varied frequencies. Is this analysis acceptable?

Appendix A.1.2 Existing and Proposed Mapping and Plans

Checklist requirement: "8.5 x 11 inch copy of site plan for public notice."

Is this only if applicable? Public notice is only required for Application to Alter.

Section 2.2.1.2 Changes to stream geometry
Example photographs of drainage structures within the stream channel, as well as clearing and development of riverbank wetland.

Could the source of the photographs be given? Are the practices employed consistent with the 1993 RISDISM?

Section 2.2.2 Impacts to water quality

Is there data to quantify the effect of the 1993 RISDISM practices that consider the entire stormwater management system measured at the water resource?

Is it fair to conclude that historic Rhode Island villages and urban areas that have not employed measures of the 1993 RISDISM are of greater concern to the water quality of the state's water resources? Is there an analysis of the impact of existing urban areas?

Section 2.0 why stormwater matters, the impact of development.
Table 2-1 Impervious cover associated with different land uses.

The correlation of impervious cover per land development is stated. The analyses in the stormwater design manual are questioned. Should this analysis be specific to watersheds that are developed beyond carrying capacity? Are all developments that include impervious surfaces a concern?

Should this analysis be presented to individual towns for adoption into their Comprehensive Plan, Subdivision and Land Development Regulations and Zoning Ordinance? Many of the goals expressed in the RISDISM are beyond the requirements of the design engineer.

UNIVERSITY OF
RHODE ISLAND

MEMO

TO: Russ Chateauneuf
RIDEM Office of Water Resources

FROM: Lorraine Joubert,
URI Cooperative Extension, NEMO

DATE: July 7, 2009

SUBJECT: Comments on the RI Stormwater Design and Installation Standards Manual, Draft May 2009

Thank you for the opportunity to comment on the draft stormwater manual. The following comments are based on my review, with input from George Loomis, Director of the New England Onsite Wastewater Training Center on issues related to soils and site evaluation. Overall, the manual represents a major leap forward in better managing stormwater runoff, and we look forward to its finalization and adoption as the required standard for new construction and redevelopment in Rhode Island. Specific comments follow.

p. 1.1 Introduction. It should be noted that a driving force for updating and applying the Stormwater Manual is the EPA Clean Water Act and specifically the Phase II storm water program. As a delegated state, RI is mandated to take effective action to reduce stormwater pollution through the RIPDES permit program.

p. 1-2, Section 1.2 Applicability of the Manual
We are pleased to see that the standards are intended for use on single family lots and other small projects typically regulated by municipalities and suitable for their use.

The methods and procedures should be reviewed to ensure they are truly appropriate for small sites with limitations such as high water tables, slowly permeable soils, and localized flooding problems, particularly where combined impacts of onsite systems, stormwater runoff, and wetland buffer loss is a threat to high quality waters.

For example:

- Are methods to calculate runoff volumes and to compare pre and post construction runoff volumes appropriate for individual residential lots, and can simplified methods be recommended for small parcels?
- Will additional design guidance be developed for small scale bioretention such as rain gardens at homes, small businesses and schools? This could include for example, simple calculation tools for homeowners and contractors installing small rain gardens.
- There is a need for guidance on managing runoff from small lots to prevent pollution and avoid nuisance flooding to neighboring properties, particularly in urban areas and densely developed neighborhoods with slowly permeable soils, high water table, and limited pervious area. Technical

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URI NONPOINT EDUCATION FOR MUNICIPAL OFFICIALS
Natural Resources Science Department / Cooperative Extension
Coastal Institute in Kingston
1 Greenhouse Road, Kingston, RI 02881
Tel: 401-874-2138 Fax: 401-874-2138 Ljoubert@uri.edu

University of Rhode Island NEMO

- recommendations are needed to remediate existing problems (disconnecting roof drains from stormsewers), and for new construction, expansion and redevelopment.
- On unsewered lots with high water table, rain gardens have been eliminated from design plans because of interference with an onsite system. Rather than waiving all stormwater controls, technical guidance is needed to identify feasible measures to reduce or mitigate impacts under these extreme situations, including for example, above ground plant filters and green roofs not typically used with single family dwellings. The guidance is needed for lots within wetland buffers under DEM/CRMC jurisdiction and for municipal use.

p. 1-6, Section 1.4 How to Use this Manual
Step 1 Determine specific regulatory requirements: DEM and CRMC should provide clear guidance on types of activities and applications subject to conformance with the final standards, and also outline procedures for coordinating with local regulations.

p. 1-7 Step 2. We strongly recommend that soil characteristics be properly identified in the field using "Standards and Procedures for Site Specific Soil Mapping in Rhode Island" available at http://www.uri.edu/ce/wq/NEMO/Publications/PDFs/SOIL.pdf. Delineation of wetland edges, to include hydric soils, should also be done at this time. Results would provide the basis for initial site planning in Step 4 and help identify locations for "Field testing of soils" in Step 5 through more in-depth analysis such as permeability tests for infiltration basins and soil suitability for onsite wastewater treatment.

If NRCS RI Soil Survey maps are used for general planning, updated digital maps (available through RIGIS, from the RIDEM mapping website and other interactive map servers, or from NRCS at the Soil Data Mart at http://soildatamart.nrcs.usda.gov/
or Web Soil Survey at http://websoilsurvey.nrcs.usda.gov) should be used rather than the paper maps as the later have not been updated.

p. 1-8. Step 4 second paragraph. "…minimizing the hydrologic alteration" of the site must take into account soil features, particularly hydrologic soil groups (HSG) and water table depths.

p. 2-2. Last paragraph. It is important to note that stormwater impacts also occur because natural treatment processes are bypassed. Suggest the following: Development not only increases runoff quantity, but also introduces new sources of pollutants from everyday activities associated with residential, commercial and industrial land uses (CTDEP, 2004). When it rains, stormwater flowing over pavement and disturbed areas carries these pollutants directly into nearby wetlands and surface waters, either by direct runoff or via stormdrains, bypassing any treatment that would naturally occur when rainwater infiltrates into the ground.

p. 3-4. Second paragraph from bottom. We agree jurisdictional wetland areas, including buffers, should be excluded from calculation of impervious area. Because of the opportunity for pollution renovation in hydric soils, especially denitrification, wetlands boundaries should be carefully delineated to include hydric soils. Also, the area occupied by stormwater facilities should also be excluded from the area calculation.

Last paragraph. What is the basis for exempting a site with less than 40% existing impervious cover from redevelopment standards? In watersheds of special resource protection waters or impaired waters this exemption may result in lost opportunities to protect or restore water quality. In addition, the type of land use and its location would be a factor since 40% impervious may be very reasonable for commercial or high density residential use in a designated compact growth zone but unnecessarily excessive in a low-density district.

p. 3-9 Section 3.3.1 LID Site Planning and Design Criteria

Add new measure #1: Assess the site and its hydrologic context.

Add new measure #12: Provide for proper operation and maintenance of LID stormwater systems with appropriate easements, education, covenants and enforcement sanctions, management and

Revise existing measures as follows:

2. Maximize the protection of natural drainage areas, streams, surface waters, hydric soils, wetlands and wetland buffers.

3. Minimize land disturbance, including clearing and grading, and avoid areas susceptible to erosion and sediment loss.

4. Minimize soil compaction and restore soils compacted as result of construction activities or prior development.

p. 3-10 Section 3.3.2 Groundwater recharge. The recharge criteria applies only to the impervious area, however, pervious areas subject to site disturbance are likely to have lower post-construction infiltration rates and therefore reduced recharge unless restored through soil amendments. The recharge criteria should be expanded to account for the loss of recharge on pervious areas unless restoration of compacted soils is mandated in all areas subject to disturbance.

p. 3-11. Second paragraph. Waiving recharge requirements for ledge, fill and other sites with physical limitations provides little incentive for developers to avoid highly marginal or unsuitable sites. Instead, additional measures should be required to maintain infiltration for example, by reducing building footprints, use of permeable pavements, green roofs, etc.

p. 4-9 last paragraph. Is 2" of topsoil sufficient for a QPA? In the Puget Sound area, 8 inches of soil with 2-4 inches of compost is required for disturbed areas (see Building Soil manual http://www.soilsforsalmon.org/pdf/Soil_BMP_Manual.pdf and Low Impact Development Center http://www.soilsforsalmon.org/how.htm) Unless naturally vegetated and in good condition, greater depth should be considered for any pervious area disturbed during construction or previously compacted, and especially for QPAs. Standards for quality of compost and percent organic matter are also needed.

How can the function of the QPA be assured in the future with various land owners?

p. 4-11 Fourth bullet from bottom. A Professional Soil Scientist, not a Class IV Soil Evaluator is qualified to determine permeability based on a soils evaluation. Soil Evaluators are not trained to identify the HSG. Although the HSG may be obtained based on the soil series, Soil Evaluators are not trained to determine soil series type.

p. 4-12 Second bullet. As noted above, specific standards and specifications are needed for restoring compacted soils, including for example, depth of tilling, type of organic amendment, and final depth and percent organic content of the soil.

p. 5-25. Second bullet from bottom. Only a Class IV Soil Evaluator or Professional Soil Scientist, not a registered PE, is qualified to verify the seasonal water table depth, unless that PE is also a Class IV.

p. 5-31. Paving stones are also commonly referred to as Block Pavers. Grass pavers should be referred to as Grid Pavers since these may be filled with either turf or gravel. Another source of information about these materials is the URI Cooperative Extension Bulletin, Permeable Pavement: What's it doing on my street, available at: http://www.uri.edu/ce/wq/NEMO/Publications/index.htm#porous

p. 5-36. Maintenance Design Guidance. Second Bullet. Some porous pavement designers, such as Cahill Associates recommend that sanding be strictly avoided. Why not adopt this more conservative approach to help prevent clogging?

Regarding salt application, is it necessary to minimize salt use outside of drinking water supply source areas?

Since snow piles contain a great deal of sand and other particles, add the requirement to avoid stockpiling snow on permeable pavement, and to identify stockpile areas on design plans and in maintenance specifications and contracts.

p. 5-60. Selection criteria. It would be useful to offer more specific guidance in evaluating the effectiveness of site design / bmp options in meeting treatment goals, particularly in steps 4 - 6. For example, this might include use of TR55 to match pre and post development hydrology, and use of simple pollutant loading estimation methods to compare potential impacts of various development alternatives. This guidance, which could be included in this chapter or the appendix, would be particularly useful for large projects and those in watersheds of special resource protection and impaired waters.

p. 5-63, Table 5-4. Regarding water table depth, wouldn't constructing bmps in the water table result in groundwater seepage with increased runoff volume discharged from the bmp? Would this possibly exceed the hydraulic capacity of the treatment system in periods of seasonal high water table? Construction in restrictive soils with a dense hardpan layer should take into account potential for lateral water movement and seepage into the BMP. If the goal is to maintain pre-development hydrology, it would be important to maintain groundwater flow paths and avoid increased surface seepage and runoff.

Glossary
p. 12 The definition of the seasonal high groundwater table should be consistent with other DEM regulations such as the OWTS regs.

Appendix B: Landscaping Guidelines and Planting List
p. 3. Second paragraph from bottom. The Soil testing lab is at UMass, as noted in the reference factsheet.

Appendix H: Assorted Design Tools
p.1 H.1.1 General notes, item 3. Are Class IV soil evaluators qualified to determine infiltration rates?

H.1.1.1. First bullet. It was my understanding that percolation testing is not the preferred method for wastewater treatment suitability and may not be appropriate here.

Third bullet - Ideally, site specific soil mapping should be used for initial feasibility, not NRCS mapping. All Hydrologic Group D soils, and some Group C soils are classified as hydric and are unsuitable development and stormwater management facilities. Wetland edges should be delineated and verified by DEM to include hydric soils in initial planning and design.

Soils with restrictive layers may also be unsuitable and should be identified. For planning purposes the NEMO MANAGE model identifies these as soil series with dense basal till (such as hardpan) with permeability of less than 0.2 in/hr at a depth of about 20-60 inches.

Finally, congratulations to all involved in completing this draft. Obviously this represents a great investment of time and effort by many individuals, and promises significant improvement in the way we manage stormwater runoff. These comments are offered in a spirit of constructive cooperation and I appreciate your time and attention in considering them.

cc: George Loomis

RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL

RIDOT Engineering Design Comments

The Manual dictates the means and methods of catchment and treatment of stormwater. The means and method are so restrictive that they be almost impossible to achieve with RIDOT linear ROW that in many cases and littered with underground and overhead utilities.

The purpose for this manual is to effectively manage the impacts of stormwater and prevent adverse impacts to water quality and habitat by:

A. Maintain groundwater recharge to predevelopment levels.
B. Maintain post-development peak discharge rates to not exceed pre-development rates.
C. Use LID techniques as the primary method of stormwater control to the maximum extent practicable.

LID techniques are engineering for site developments. RIDOT's Transportation System The issue for RIDOT is that LID techniques are not achievable in a cost effective manner for the water shed size and water volume of RIDOTS current systems nor is it economically achievable to design new systems of this size to LID techniques. However, that is not to say that the water quality contained within cannot be achieved by other means.

The cost for RIDOT to implement and adhere with this manual will be in the millions.

For example:

1. **<u>Maintenance</u>** would be required to:
    - Clean every catch basin within the RIDOT ROW every other year. Failure to do so could result in fines assessed by DEM or CRMC.
    - Mow every drainage swale in the state in mid August to a height of 4 inches. Failure to do so could result in fines assessed by DEM or CRMC.
    - Aerate all swales every other year. Failure to do so could result in fines assessed by DEM or CRMC.
2. **<u>Engineering</u>** would be required to:
    - Design pretreatment systems that have a manhole between every catch basin.
    - Bring all drainage systems up to current standards even for resurfacing projects. For many rural roads (such as Route 102) this would require land acquisitions to widen and flatten swales. For many urban roads this would require land acquisitions to for treatment ponds that include forebay, channel pool, micro pool, 25 foot set backs and other minimum basin requirements.
    - Revamp the RIDOT Drainage Design Manual.
    - Surface detention is prohibited for cold water discharges.

3. **<u>Construction</u>** would be required to:
    - Inspect all Drainage components after each storm event.
    - Maintain daily inspection logs.

The overall cost to implement this will be well in the tens of millions on an annual basis.

RIDOT should request that:

- It be relieved from the engineering design requirement and to only be required the meet the minimum pollutant loading requirement at the point of discharge regardless of how RIDOT chooses to meet the requirements.
- All components of our drainage systems (including swales and drainage ponds) be relieved of all regulations for ASSFs and wetlands to the point of discharge.
- Establish a more achievable maintenance schedule.
- Relieve maintenance level resurfacing projects form the requirement to upgrade to current standards.
- RIDOT would still be required to meet RIPDES and LUHPPL requirements.

RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL

PUBLIC REVIEW DRAFT

MAY 2009

RIDOT NATURAL RESOURCE UNIT REVIEW COMMENTS

Comments on Overall Document

As a State agency, RIDOT is responsible for the design, installation, and maintenance of literally thousands of drainage structures and stormwater management facilities, over hundreds of miles of State Highways. The new Stormwater Manual includes many practices which will be unfamiliar to our design, construction, and maintenance personnel, as well as the consultants and contractors who work with RIDOT to implement their use. As the agencies preparing to implement these regulations, it is expected that RIDEM and CRMC will provide no or low-cost training for the regulated community in the application of the manual for all phases of a project lifecycle (ie: design, construction, and maintenance).

The standards, criteria, and guidance included in this manual appear to have been developed with a strong emphasis on site development projects, rather than linear construction projects, and will not necessarily be feasible or practicable when undertaking the type of roadway projects with which RIDOT is generally involved. As an example, LID practices for site development are often different from LID practices for linear projects (ie: there are no rooftops in road projects). It would make sense for there to be a separate section in the Manual relating to LID practices for linear projects as well as a separate Checklist for linear projects in Appendix A.

The manual does not include any reference to RIDOT Standards and Specifications or Standard Details, indicating that they were not consulted in the development of the manual. This is shocking, considering that the regulation of state and local road projects will be governed by this document. Had RIDOT been consulted in the development of the manual, there would have been opportunity to have collaborated with RIDEM and CRMC during the entire process to allow the State's construction specifications and the manual to better compliment one another.

Comments on Specific Sections

3.2.4 – This section directs project proponents to consult "DEM's Water Quality Regulations, Fish and Wildlife Division to determine if a project is in a watershed draining to a cold water fishery." The Water Quality Regulations do not appear to contain information on specific cold water fishery locations. There is also no information readily available on the Fish and Wildlife section of the RIDEM website relative to this issue. Is the project proponent supposed to use the GIS Environmental Resource Maps on the RIDEM website? Does the current version of the Freshwater and Anadromous Fishing Regulations contain adequate information to make the determination? Is the consultation supposed to occur on a case by case basis directly with RIDEM staff? If so, which office is the appropriate point of contact?

3.2.6 – It is stated that "removal of roadway materials down to the erodable surface is an activity defined as 'redevelopment', but simply resurfacing of a roadway surface is not." There is no quantifiable definition of "erodable soil surface" included in the manual. Pavement structures typically include one or more Surface Course (bituminous asphalt or concrete), as well as Base and Subbase Courses, depending on pavement type and local conditions. There are different types of resurfacing which occur to different depths in the pavement structure with different types of pavements and over different types of foundation materials. RIDOT's Standards and Specifications for Road and Bridge Construction (Sections 301, 302, M.01.08 & M.01.09) includes several types of Aggregate and Gravel Base and Subbase Courses. Clarification as to whether or not these materials are considered non-erodable is requested. Also, there is no mention of repairing sidewalks, parking lots, or other existing, non-building, impervious surface. How will these areas be treated?

In defining the limits of a "site" for linear projects, will the limits of the highway plat, including permanent easements, to the ends of the project length be sufficient to calculate site size? This is as opposed to having to include an entire plat beyond the project area, and the limits of entire parcels where an easement is proposed.

It is indicated that storm water management may be proposed off-site for redevelopment projects, however, there is no hierarchy of preferred site types given. Will sites in the same watershed reach be preferable to those up- or downstream? Will the same watershed be more acceptable than a different watershed? Where will information be available to determine if a specific area has been approved as an off-site location for storm water management. How will a future perspective buyer of such a property be made aware that there are restrictions on the use of the property (ie: will any instrument be required to be recorded on land evidence records)?

3.2.12 – States that stormwater management plans must be reviewed by local governments. As a separate MS4 and a State Agency, RIDOT is not required to obtain local approval of stormwater management plans.

3.3.3.1 – Are only gravel roads considered impervious? RIDOT has used (small) gravel parking areas on past projects to reduce the amount of area considered as impervious.

3.3.6 – The criteria for determining if a downstream analysis is required for linear projects should be based on a value such as the proposed change in % impervious cover relative to existing conditions, rather than being a dependent of 'Site Size". The size of a linear project, which may travel through many watersheds, is generally less important to the local hydrology, than the change in impervious area. This would still leave the reviewing agency the latitude to require such an analysis when local conditions require it.

4.6 – This section disallows all wetlands, including riverbank and perimeter wetlands from being utilized as QPA's. This appears to be counterintuitive, when it is considered that some of the recognized functions/values of these areas are to provide water quality renovation and storm water attenuation. If the stormwater is not being transferred from one subwatershed to another, why would these areas not be available for use as QPA's? There is not even an exception for previously existing and/or approved landscaped areas within riverbank, perimeter, and/or

floodplain wetlands or areas within 200 feet of a coastal feature (as there is for WVTS and other structural practices)?

It is stated that "excessively fertilized lawn areas" are not considered eligible for use as a QPA. This term requires quantitative definition in the manual. It is implied that areas of non-excessively fertilized lawn are acceptable for use as QPA's. What will be required on the part of the project proponent to demonstrate that the QPA is not being excessively fertilized following construction? This should involve some type of maintenance requirement, similar to that required for structural practices, and at a minimum should require soil testing and submission of analytical results on a regular basis. Where will information be available to determine if a specific area has been approved as a QPA? How will a future perspective buyer of a designated QPA be made aware that there are restrictions on the use of the property (ie: will any instrument be required to be recorded on land evidence records)?

4.6.1.1 – Registered Soil Scientists should be permitted to provide the evaluation of soil permeability and water table depth within a QPA.

What records must be consulted to determine if there is a "history of groundwater seepage and/or basement flooding". Does a single event constitute a history? Are anecdotal reports subject to consideration?

5.2 – These comments refer to the Summary Table at the beginning of the Section on WVTS, however they may apply throughout the section.

"Deepwater Zone" is an undefined term, however it is used in the design requirements.

It is required that various volumes of water are stored at depths in 6" increments below the water surface, however 1-foot contour intervals are standard for construction plans. There is NO requirement included in Appendix A for the depiction of proposed contours on site plans, and existing contours are only required at 2-foot intervals. These required design depths should be revised to 1-foot increments.

Does the use of the term "structures" refer to buildings only? Will there be a 35' setback required from non-occupied structures, such as roadways and bridge foundations?

5.2.1 – Does the term "jurisdictional upland buffers" refer to the area within 200-feet of a coastal feature? RIDEM and CRMC Freshwater wetland regulations define riverbanks, perimeter wetlands, and floodplains as <u>wetland</u>, NOT upland or buffer.

WVTS's are permitted "in areas already altered under existing conditions" within "jurisdictional wetland buffers" Will WVTS's be permitted on currently undeveloped/undisturbed portions of a site if that area is permitted to be disturbed during construction of a project for other reasons? (ie: disturbance required for construction access).

There is a prohibition on discharging from a WVTS "within 200 feet of jurisdictional waters, including wetlands" in the watershed of a cold-water fishery. Based on the usage of terms within

the draft manual that do not appear to correlate directly with existing regulatory terminology, this requires clarification. Does the term "wetland" in this instance refer to all areas regulated as freshwater wetland (ie: including riverbank, perimeter, floodplain, etc), or only those areas which would be classified as wetland based on the federal classification criteria utilizing vegetation, soils, and hydrology (ie: biological wetlands).

It is stated that, for non-LUHPPL sites, "the volume below the permanent pool shall not be included in storage calculations...." Should this be interpreted as the volume below the surface elevation of the permanent pool?

5.2.2 – the required Elements for the WVTS indicate that erosion may be prevented at the outfall "typically by use of appropriately sized rip-rap placed over filter cloth." It may be prudent to revise the wording to include appropriately sized <u>and bedded</u> rip-rap.

The term well-drained gravel should be defined.

The Design Guidance section states that "Outfalls should be constructed such that they do not increase erosion or have undue influence on the downstream geomorphology of any natural watercourse by discharging at or near the stream water surface elevation or into an energy dissipating step-pool arrangement." The way the sentence is written makes it unclear as to whether or not the described conditions are desirable design elements or causes of erosion.

5.2.4 – Is there a minimum length for the flow path? Is the 2:1 ratio required for each inlet? Is it acceptable to have a shorter flow path for an inlet carrying a small percentage of the total inflow?

5.2.5 – Is it acceptable for the safety bench (Required Element) to contain portions of a sidewalk, road shoulder, bike path, and/or vehicle travel lane, provided that the slope requirement is met?

The Design Guidance should include a caveat to the use of landscaping to attract wildlife that points out that this may not be desirable along roadsides and within airport flight paths, among other possible locations. Depending on the species, and the distance from the roadway, attracting wildlife in these areas may increase mortality and also increase the incidence of human injury and property damage resulting from animal-vehicle collisions with large vertebrates, such as white tailed deer. This is increasingly a liability issue for State and local DOT's.

5.2.6 – Required Elements for Maintenance Access state that a ROW or easement shall extend from a public or private road to each WVTS. Any such access shall require the owner of the WVTS to obtain, at a minimum, a Physical Alteration Permit from RIDOT when the access is along any state road.

5.3 - This comment refers to the Summary Table at the beginning of the Section on Infiltration Practices, however it may apply throughout the section. It is indicated that no infiltration system may be constructed in an area of known soil contamination. There may be instances where it would be appropriate to allow a variance to this rule. If a facility is proposed on an I/C site, and the exceedances are all below I/C DEC, there are is no exceedance of Method 1 Leachability

criteria, and an ELUR will be recorded on the property, would RIDEM/CRMC consider allowing infiltration?

It may be helpful to applicants if it is pointed out in the manual that the many of the practices described in this section will require approval by RIDEM's UIC program.

5.3.1 - The Required Elements indicate that infiltration practices must be located "50 feet from areas with natural slopes greater that 15%." Can it be assumed that this refers to areas of downgradient slope only?

One criteria states that "the bottom of infiltration practices cannot be located in fill" and the very next criteria states that infiltration practices cannot be located in areas of known contamination "unless contaminated soil has been removed and the site is remediated." In the second instance, wouldn't this mean that the bottom of the practice would be located in fill?

The Required Elements state that infiltration facilities "shall be located <u>at least</u> 200 feet horizontally from all surface water supplies and tributaries." Can it be assumed that this means all surface <u>drinking</u> water supplies? Also, there are multiple references to setback distances from non-critical surface waters. The term "non-critical surface waters" requires definition in the manual. No mention is made regarding any limitation on the use of these practices within the boundary of a Sole Source Aquifer (SSA). What is the reason for this? Typically the EPA requires RIDOT to provide impermeable liners on all stormwater practices within SSA's to prevent contamination of drinking water.

It is stated that Infiltration cannot be used where it may cause "water problems...to downgradient properties" What criteria are to be used to determine the potential for this to occur? Aren't the other Required Elements (ie: <15% slope requirement) designed to prevent this type of situation?

5.4 - Why is there no Summary table for the Permeable Paving section as there is for the others?

5.4.1 - Registered Soil Scientists should be permitted to provide verification of the SHGT.

The term "non-critical surface waters" requires definition in the manual.

5.4.4 – Is there an approved method for evaluating compaction?

5.8.1 – Why are all roads grouped together? It would seem reasonable to expect that different practices would be more suited to urban roads versus rural roads.

6.3.2 - Where will information be available to determine if a specific area has been approved as a filter strip? How will a future perspective buyer of such a property be made aware that there are restrictions on the use of the property (ie: will any instrument be required to be recorded on land evidence records)?

6.3.3 – Requires corrective action with the buffer of a filter strip. The term "buffer" as it applies to filter strips requires definition in the manual.

6.5.1 - Why is the contributing area used as the limiting factor for deep sump basins, rather than flow rates? If there is an area larger that 0.25 acres that will not exceed 3 cfs for the 10 year storm what is the reason that it should not be directed to a single deep sump basin?

6.5.3 – The requirement to inspect catch basins 4 times a year is excessive and burdensome for most applicants. The RIPDES General Permit for Small MS4's only requires an annual inspection of catch basins, and allows an exemption to even this frequency for RIDOT , when the system is located outside of a UA or CDPA (See RIPDES Gen. Perm. For MS4's Section IV.B.6.b.1.iii).

Why is the MADEP Standard Detail for deep sump basins used in the Manual. It is recommended that the RIDOT Standard Detail be incorporated, as this is the detail used most frequently in this State. If there are concerns with the RIDOT Detail, this office should be contacted to discuss revisions to comply with the manual.

<u>Appendix A</u>
A.1.1 – Registered CPESC and RLA should be adequate as contact for Stormwater Plan, in accordance with the RIPDES Program requirements.

A.1.2 – There is no requirement for proposed contours to be included on plans.

The *Guidance for Preparation of Subwatershed Maps* should be included in the manual to avoid conflicts if other agencies besides RIDEM develop different guidelines. The maximum scale requirement for these maps should be clearly stated to avoid confusion regarding required scale.

There is a requirement to include perennial and intermittent streams and ASSF's on the plans, however these terms are not defined in the manual.

Registered Soil Scientists should be permitted to provide soils information from test pits or borings.

Not all projects including stormwater management facilities will be required to undergo public notice (PN), therefore the required 8.5 X 11 plan should be conditional, based on the determination of the need for PN. It is often a burdensome and expensive drafting exercise to develop these reduced scale plans and make all of the text legible at the reduced size.

A.1.3 – What actions will be adequate to satisfy the requirement in MS#9 to "Demonstrate that there are no illicit discharges to the stormwater management system"? How will physically interconnected systems be handled? If an illicit discharge is detected, will RIDEM enforce it's removal? Once the illicit discharge is referred to RIDEM for enforcement, can the applicant proceed with the design of the system based on the anticipated conditions following disconnection of the illicit connection?

MS #10 requires the identification of staging and stockpiling areas. It is not always possible for RIDOT to supply this information, as it is often left up to the contractor to secure such areas after award of the contract, and often they are outside of property that is owned or controlled by RIDOT. One approach we have used in these situations is to develop constraint mapping showing the contractor the areas within RIDOT control that are acceptable and unacceptable for such activities.

A.1.5 – It is assumed that the only permits and legal agreements required to be listed are those relating to stormwater and to the maintenance of the proposed stormwater management system.

Appendix B

B.6 – Table used to present acceptable grass species is from a document prepared for use in Virginia. What sources were used to verify that these species are appropriate for use in Rhode Island? At least two of the species included in this section are listed as unacceptable or invasive by ACOE New England District in their *Guidance for New England District Mitigation Plan Checklist.*

B.9 – No fewer than 6 of the species listed in this section are included on the list of unacceptable or invasive plants in the ACOE New England District in their *Guidance for New England District Mitigation Plan Checklist*

The CRMC URI Interactive Plant Guide is cited as a resource for additional acceptable plant species. While this is a useful resource, it was developed specifically for use in coastal areas. Are there other/additional plants that would be acceptable for use in the inland portions of the state?

Appendix C

C.6.5 – ASSF's (which are not defined in the manual) are regulated wetlands in Rhode Island. Alteration of these areas requires a wetland permit. This should be clearly stated in this section of the appendix, as the use of regulated wetlands has been discouraged in other sections and is seemingly encouraged here.

Appendix D

It is noted that this section is stamped "Revision Pending". It is recommended that whatever revisions are forthcoming to this Appendix, the inclusion of at least one linear project example be added to the document. This should include specific examples of how the LID techniques, determination of downstream analysis requirement, QPA's (with contributing areas of no more than 1000 sq ft each), and deep sump catch basin configurations are envisioned to be incorporated into roadway redevelopment projects (ie: a full depth road reconstruction project).

Appendix E

While it is understood that many stormwater facilities will require a registered engineer to review and stamp the design plans and any structural repairs to the system, it is unreasonable to require that Registered Engineers perform or oversee maintenance inspections. If RIDEM is going to let homeowners "self certify" their compliance with wetland permits, how can this requirement be justified? Anyone with a reasonable level of experience working on a roadway maintenance

crew and familiarity with reading a site plan is capable of performing these tasks for a RIDOT stormwater facility.

Throughout this appendix, there is a requirement to include inspection of every stormwater management system after every storm even which equals or exceeds the 1-year storm event. While it may be reasonable to require this type if inspection schedule for a limited period following construction (ie: until stabilization is documented), this is an unfeasible and unacceptable requirement for RIDOT. There simply are not the resources within the Department to mobilize the number of (non-existent) staff to inspect the hundreds of structures owned by RIDOT every time this threshold is exceeded. This requirement also exceeds the inspection frequency typically required by RIDEM's and CRMC's Wetland Programs as well as the RIDEM Water Quality Certification and RIPDES Programs.

There are also several times that a requirement is given to mow 4 times annually around various practices. This required frequency is excessive and unacceptable to RIDOT. The State does not have the personnel or the equipment available to meet this schedule. An annual mowing is adequate to prevent the establishment of woody vegetation. If RIDEM and/or CRMC have the capacity to support the FTE's (and/or seasonal employees) and fund the acquisition of the equipment to make such a schedule feasible, RIDOT will be pleased to discuss housing and maintaining the equipment.

E.1.3 – The requirement to vacuum permeable pavement every 3 months is excessive. The University of New Hampshire Stormwater Center, on their website, recommends a minimum of 2 times annually.

E.1.5 – What methods are permitted for the "removal" of burrowing animals?

There is a statement that sediment should be removed from the bottom of the swale. Is there a maximum depth or volume of sediment above which removal is required?

Appendix F

Various sections reference NRCS and other specifications. RIDOT specifications and standards will govern on RIDOT projects. It is requested that RIDOT Specifications be referenced in this section. If there are any concerns with the existing specifications, RIDOT is willing to discuss revisions to comply with the intent of the manual.

Various sections refer to approved products for use as filter fabrics. Was the RIDOT Approved Products list consulted in developing the "partial listing of available filter fabrics" that meet the Class "C" filter fabric requirements for rip-rap? This would be useful as the products that are included on the RIDOT Approved list are most likely to be available locally. What "Specifier's Guide" was consulted for this information (see section F.1.4.3)? No listing was apparent in the references? Is there no more recent reference available other than a 1997 product listing?

F.1.4.3 – Is there a reason that bedding stone is not indicated for use with riprap and filter fabric? The use of bedding stone typically extends the life of the filter fabric.

F.1.7 – States that a Dam O&M plan is required for all basins. Is this the intent of this section, or is this requirement meant to apply only to those basins which meet the definition of significant or high-hazard dams, as stated in Section 5.2.1?

It is stated that "written records of maintenance and major repairs need to be retained in a file." For what period of time are records required to be retained?

Item 3 states that a PE must certify compaction for "all stormwater management facilities." It is assumed that this refers only to WVTS's as that is the subject of this section.

F.2.1 – This section makes various references to Figure 5-3, however, the terms used in the text are not included on the diagram. It would be helpful to the reader if the labels were provided.

It is stated that the risers must have a maximum spacing of 15 feet. 15 feet from what? There are no minimum distances indicated on Figure 5-3. Are they supposed to be 15 feet from each other? The inlet pipe? The wall of the cell? The riser in the next cell? The outlet?

The Appendix states that the vertical cleanouts are to be perforated in the stone layer, however they are pictured as solid in Figure 5-3.

The recommended construction described for the berms, described in the Appendix, is not depicted on Figure 5-3.

<u>Appendix G</u>

G.4.1 - This section points out that street sweepings may be regulated as hazardous waste. Earlier sections of the manual have indicated that sediment removed from structural practices "that do not receive runoff from designated LUHPPL are generally not considered toxic or hazardous material, and can be safely disposed by either land application or land filling." (see 5.2.6) It appears that this contradictory information could pose a problem for the facility owner attempting to properly handle the material.