**Minimum Design Criteria (MDC) Team
08/25/2014
Triangle J COG, Durham**

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| **Attendees** |  |
| ***Team Members*** |  |  | ***Others*** |  |
| Eban Bean Bradley Bennett Jonathan BivensTim ClinkscalesTracy DavisBoyd DevaneHunter FreemanMike GallantJoe Hinton Marc HouleRon HorvathBill HuntLinda Lewis | **[x]** **[x]** [x] [x] [ ] [x] [x] [ ] [ ] [x] [ ] [x] [x]  | Brian LipscombAnnette Lucas Mike MacIntyreTodd Miller Cameron MooreTom MurrayRobert PattersonDerek PielechPeter RaabeLarry RaglandJD SolomonVirginia SpillmanToby VinsonRob Weintraub | [x] [x] [x] [x] [ ] [x] [x] [ ] [ ] [ ] [x] [x] [ ] [ ]  | Julie Ventaloro, NC DEMLRAndrew Anderson, NC State |

**Infiltration Basins continued – Group Discussion**

**Item 13 – Runoff volume per inlet device**
Tim – Don’t think this should be a requirement. If have riprap apron, this wouldn’t matter.
Robert P – Any inlet should have properly-sized energy dissipator.
Annette – Term “properly sized” may need to be tweaked per guidance from RRC attorneys.
Marc – Most muni’s have design standard – could say must be designed to local standards, methodology.
Annette – Might be awkward for state manual to refer to local standards.
Marc – What does it say in our sediment erosion control manual?
Todd – Could we say that it shall be designed to prevent erosion at discharge point?
Annette – How about this: “Inlets to the infiltration system shall be designed to prevent erosion at the discharge point.”
JD – Is #13 needed at all?
Annette – Is it an MDC?
Andrew – Sounds like first one would satisfy criteria for MDC.
JD – We’re not shortening the document; some of it is creeping back in as legacy.
Brian L – We may already have this covered in general MDC portion.
Todd – Is this a common problem in the field?
Mike M – Yes, but it’s easily correctable. Often not a problem of design, but of construction.
Annette – I’m not sure if we’ve addressed it in our general MDCs for all devices – I’m not seeing it. Some have suggested changing #13.
Mike M – Can we put this in for the general MDCs?
Jonathan – Change “discharge” to “inlet.”
Hunter – Can change it to apply to any BMP.
Linda – When we allowed infiltration systems beyond 1.5,” we were seeing concentration of larger design storm at one inlet blowing everything out inside basin itself, so we needed to deal with making sure inlets were spaced out so not everything going to one point. In wet pond, it’s different because have standing water to dissipate some of the force. Are we going to keep this option to overdesign an infiltration system?
Annette – [Reviewed what group has already agreed on for infiltration systems.]
Linda – Erosion at inlet needs to be designed for.
Group agreed to change language to: “Inlets to the BMP shall be designed to prevent erosion at the inlet” AND move to General BMP requirement section. [Further changes made – See Item 14 below.]
Tim – Want to point out that infiltration system will likely be oversized per local requirements to control flooding.

**Item 14 – Flow spreading**
Andrew A - #13 would cover it if changed it to say “prevent erosion within the BMP” instead of “at the inlet.”
Group agreed to eliminate Item 14 if change Item 13 to “Inlets to the BMP shall be designed to prevent erosion within the BMP” AND move it to general BMP requirement section.

**Item 15 – Bottom of infiltration basins**
Jonathan – There’s no natural sand for sale -- nothing’s that clean.
Todd – So should we not be putting sod in these basins?
Robert P – Don’t know why not. If it works in bioretention cell --
Hunter – Whatever vegetation you put in has to meet infiltration rate.
Todd – Some sod is pretty impermeable.
Hunter – It’s absolutely a concern.
Annette – BMP Manual says “. . . unless the native soil is equivalent.”
Todd – Is issue here what the rate of infiltration is? Should we have a standard for that rate?
Annette – I think we covered it at last meeting under Drawdown Time and Soil Investigation item. Geometry of device could be modified for slower infiltrating soils. Is there value of putting some sort of sand in the bottom of it? Do we want to talk about vegetation in the infiltration system?
Eban – Basins that performed well had better/diverse vegetation, deep roots, not being compacted. Vegetation is good for maintaining quality of soil.
Annette – Should we provide specifications for the vegetation, or guidance?
Eban – DOT ponds were working best -- and those weren’t maintained as well as ones that were sodded. I would say that we may not want to go as far as requiring it but type of vegetation is important. Don’t want trees in there. Put in as recommendation maybe.
Jonathan – AASHTO soil classification system – cleanest thing is almost a gravel. Will have to wash them to get cleaner. I don’t think anything will approach Item 15 in a commercially-available product.
Eban – Say vegetation is encouraged to maintain good infiltration through the surface of the basin or something along those lines.
JD – Throughout vertical profile --
Jonathan – The better your vegetation is, the worse the basin is going to work.
Eban – That’s not what we saw. Even sandy ones, ones with vegetation worked better. We want to allow vegetation to be there, natural vegetation, not sod.
Jonathan – Want volunteer vegetation.
Group agreed to incorporate the following as a Recommendation “Herbaceous vegetation is allowed to maintain good infiltration rates throughout the vertical profile of the infiltration basin.”
Group agreed to strike Item 15.

**Item 16 - Drainage medium for infiltration trenches**Robert – Key is having washed stone or gravel.
Annette – Is it okay to use sand too?
Todd – Is this same as French drain? New septic tanks are using Styrofoam chips instead of rocks.
Annette – I heard that’s not very durable.
Jonathan – Should we write it so you can use something else, for example, slag? Slag is very durable. Do we open it up?
Hunter – Still has to meet performance spec.
JD – Don’t need geotextile fabric for all alternatives.
JD – Do you even need fabric for sand? Will just get clogged up and fail. A trench drain, you’re trying to get water in, it’s fine, but don’t need fabric for reverse. Might just recommend that will allow varied infiltration devices, not just trenches. It can be buried under parking lots, for example, as opposed to being an open mosquito pit. Plus, we don’t know what someone might come up with in future.
Hunter – We’re concerned with performance criteria, not type of material being used. If have reasonable expectation will hold its volume, that’s the only thing I would want to ensure as an engineer of the system.
Jonathan – Maybe I just missed it, but are these buried devices?
Hunter – Sketch of infiltration device in BMP Manual is trench.
Robert – There are two – one is buried, one is exposed.
Tim – I think it’s already taken care of. I don’t think anything needs to be written here. Will have to meet requirements of the State.
Robert – I agree. Why do we need this item at all?
Andrew – Is there a place to ensure that new, novel devices won’t export metals?
Annette – We’re trying to communicate that we’re open to other geometries, materials, underground, etc. Should we just get rid of this whole thing?
Tim – State has list of things that are approved right now. Don’t want to have to go through a process to get things approved in the future.
JD – From my standpoint, I’d like to have something here that says expressly can use a trench.
Todd – Whole section is called devices, not infiltration basins.
Group agreed to table Item 16 until get through next several items. [Further discussion below.]

Hunter – What is meant by “other types”?
Todd – Whole section is called Infiltration Devices, so maybe we don’t need it.
JD – This was originally specifically about trenches.
Robert – What if we said infiltration trenches are allowed underground?
Jonathan - I’d skip “trenches” and say “infiltration devices” can be buried. Leaves it open for new types of devices.
Group agreed to change Item 16 to “Infiltration devices may be buried” and make it a Recommendation. Group agreed to combine this Recommendation with Item 18 Recommendation.
Also see Item 24 for additional language for this Recommendation.

**Item 17 – Geometry**Mike M – If are on slope, we’re allowing people to put baffles in underground, each cell has to be flat.
Jonathan – You can’t grade dirt to that grade (.05%). If you get flatter than 2%, any undulation, water’s going to sit on it. Paved roads, 2% is minimum grade to get water off it.
JD – It needs to be in words and not so many significant figures.
Tim – It needs to say “level” and not a certain percent.Robert – This is design specification. It needs to be designed flat. In the field, it’ll be off a little, but don’t want to design to 4% and then it be off to 7-8%.
Boyd – Can you say infiltration “area?”
Mike M – Some will confuse infiltrating surface with permeable pavement.
Boyd – Permeable pavement chapter says “Surface of soil subgrade --”Group agreed to change Item 17 to “The surface of the soil subgrade shall have a slope of less than or equal to two percent (level). Terraces and baffles may be installed to achieve level subgrades.”

**Item 18 – Trench geometry**Annette – This doesn’t have anything to do with water quality.
Linda – What if definition of injection well changes?
Robert – Can just reference in chapter that they check this, but not have it in our standards.
Annette – If it is an injection well, then just a notification, right?
Robert – Right.
Annette – I’ll work on the language here with Aquifer Protection to see if infiltration device requires notification as injection well.
Group agreed to strike Item 18, but make it a Recommendation, not an MDC.
Group agreed to combine this Recommendation with Item 16 Recommendation. **Item 19 – Trench geometry**
Linda – Depth will be controlled by SHWT anyway.
Eban – Should we keep last two sentences as a Recommendation?
Robert – I think we could have it in the body of the chapter.
Group agreed to strike Item 19.Group revisited Item 16. [See further discussion in Item 16 above.]

**Item 22 - Observation Well**Hunter – Inspectors use them to see sediment accumulation. But that’s on an underground system only. Adequate access is necessary for observation and maintenance.
Robert – Change it from observation to focusing on allowing access for inspection and maintenance.
Hunter – Adequate access must be provided for maintenance and inspection.
Annette – I think access part is already provided in general MDCs. This is specific for observation.
Hunter – Does it become a recommendation then for buried systems?
JD – I like inspection ports better than monitoring well.
Hunter – If have ten feet of pipe, do you need just one port, or more?
Boyd – We say a minimum of one shall be provided at low point of system, except if terraced, need one per terrace.
JD – There’s a size issue as far as number of ports needed.
Hunter- What’s adequate to maintain whole system?
Jonathan – Adequate inspection ports must be provided; not sure about having a minimum number. If we’re going to put an acre under a parking lot, one port won’t be enough.
Annette – From guidance from Rules Review Commission (RRC) on wet pond MDC language, when we use words like “adequately,” that will be hard to determine how DENR will implement this.
Linda – Would like way to quantify number of ports needed.
Andrew – Depends on type of maintenance issues.
Annette – What about borrowing language from Permeable Pavement chapter? Although this doesn’t address if system is larger, all level at 2% grade. Ideas? If we say “adequately,” RRC will question what we mean by that, how to enforce it.
Jonathan – If designer doesn’t provide more than one, if that one gets fouled, you may have to do maintenance it didn’t really need. That gets back to a design matter, not a requirement. Not against minimum of one, but it cuts both directions.
JD – Can you go back to minimum of one, or one per “X” feet of infiltration area?
Boyd – We do that on amount of soil tests for permeable pavement.
Tim – Can we take this out and handle it in Item 21, but take out case-by-case basis? Item 21’s in the code already. If you do it a bunch of times and get reputation of having to do extra stuff -- without someone really having deep knowledge of what a reasonable amount of area is -- we’d be having wells every other parking stall. How do we know what a reasonable number is? Three-acre parking lot, you’d have twelve ports.
Todd – We’re requiring a maintenance plan to be developed and approved, right? You have variation in these devices, don’t want a cookie cutter maintenance plan.
Annette – We pretty much get a cookie cutter maintenance plan.
Todd – We’re talking about different devices.
Annette – There’s different maintenance plans for different devices. Maintenance plan for infiltration doesn’t talk about number of wells.
Brian L – Do we need to specify number of ports for each chamber?
Robert – Some manufacturers will require ports at various sections of the system, chambers. If system is flat, what’s the lowpoint?
Mike M – The farthest away from the traffic.
Linda – Won’t we not know until after construction where the low point is? They’re not going to design it at 2%; it’s going to be what the tolerance is after it’s constructed that you’ll be allowed to be at 2%.
Jonathan – You just want them to check system at lowest elevation. You come back two years from now, bottom will be silted in level. Eventually, it will silt from there. That’s what the inspection ports are for – does it silt up where it doesn’t function any more.
Group agreed to change Item 22 to “For buried infiltration devices, a minimum of one inspection port shall be provided.” **Item 21 – Observation well**
Group agreed to strike Item 21 and handle it under Item 22.

**Item 23 – Vegetated filters**Linda – If not in SA waters, what is point of putting overflow through filters? I’ve been suggesting we remove this for years.
Eban – What is language about protecting erosion at outlet downslope in wet pond chapter?
Annette – Not sure there is wording about erosion at outlet? Maybe it would be good to have general MDC about this.
Boyd – We should have something about discharge at non-erosive rate, or about just not having erosion.
Eban – Overflow should be discharged at non-erosive rate at outlet or overflow bypass?
Hunter – Suggest “The outlet of the system shall be designed to prevent erosion of the receiving channel.”
Annette – What if it’s not a channel?
Tim – Who determines what that is?
Hunter – An engineer. We talked about design of inlet dissipator, so this would get to that same thing for outlet.
Robert – Land Quality has standards in their manual. . . .
Jonathan – Might not be a channel, could be many things.
Hunter – How about “receiving area”?
Tim – Who’s going to tell me that’s not going to work? It’s a given as an engineer that’s what you should be doing. I have no problem with the language, but will the Agency not give them permit if they disagree? Little Washington is where this is bigger. How do you enforce this statement?
Eban – Can we agree it should have a non-erosive velocity?
Hunter – This is assumed in that statement.
Mike M – Chapter 8 in erosion control manual is a good place to start.
Tim – Will someone say a riprap apron is good enough for non-erosive velocity? We had to fight to get that.
Annette – Should we specify certain size storm?
Hunter – Potential conflict I have with that is erosion control permit runs out when grading permit over. Needs to be tied to post-construction permit that runs with the site. Can’t rely entirely on erosion control permit.
Tim – To the guy that rips it out, permit means nothing. Courtroom is going to fix that problem.
Hunter – At review stage -- if no outlet dissipator, but plan is sealed -- is reviewer’s only recourse to go to the Board?
Tim – That’s correct.
Hunter – I think it’s the responsibility of review to check calculations for MDCs.
Tim – In fast track, no review.
JD – Structural engineering, it would be like saying without excessive deflection. As engineers, we ought to know what is excessive flow.
Jonathan – If I’m the reviewer, I don’t want to get into the weeds, I just want to see was it considered. I see Tim’s point that reviewers can have different perspectives. If get a plan that doesn’t have anything as far as dissipation, reviewer should be able to say something. Is there some language you’d agree to, Tim?
Annette – Hear a lot of discussion, not sure where everybody’s coming out on this.
Tim – If it’s just open dirt, it’s not really stormwater folks’ game.
Annette – Recognize there is a link between disturbed land surfaces and sediment in stream.
Tim – Fine to put it in here, but not every project is a stormwater issue on the outlet. You’re treating design storm at non-erosive event. Just don’t know how you say – it’s a given that engineer has disclosure to design as she or he sees fit.
Annette – This doesn’t look very prescriptive to me, but would we want to specify a size of storm so someone doesn’t interpet it as 100-year storm, for example. I know that’s in the sediment/erosion control manual -- the 10-year storm -- but we can’t hold people to those standards in that manual in our rule.
Todd – What are implications for maintenance from larger storm than 10-year storm?
Annette – There may be repair needed after larger storm. But if you design it for larger storm, would need a lot of riprap, added expense.
JD – Can you just reference best practice or standard practice for erosion control? Does that capture ten years from now what the design storm will be whether I’m in Little Washington or Asheville?
Annette – We can reference a document that’s nationally published.
JD – Seems like if we move it to general MDC, we’ll have to debate it again later.
Annette – RRC recommends against referencing a technical manual. Technical manuals are not rule; they are guidance for achieving compliance. We’ll write a chapter for General MDCs. In the entry for this item, we can reference the sediment and erosion control manual among other things.
Jonathan – I think we’re being too prescriptive. Designer is one who’s sealing it. Says “shall be” designed. They need to determine what storm they need to use. If it’s discharging into a farm field, not as worried about a little bit of silt. That person needs to make an engineering determination and put it on plan. Reviewer assumes no risk or liability. Checks for device that prevents erosion, moves on.
Annette – So you’re saying you don’t want us to specify a size storm?
Jonathan – Designer will determine that based on location, situation.
JD – Agree – let engineer decide that.
Tim – Just want to say that we need to be careful about these statements because they will be misconstrued sometimes.
Group agreed to change Item 23 to a General MDC: “The outlet of the system shall be designed to prevent erosion of the receiving area.”

**Item 24 – Pumped infiltration systems**Linda – We get them where best infiltration is at top of system, and they need to figure out how to get the water up there.
Annette – Similar to what we talked about with wet ponds, which method to use. Statement about what we’re trying to achieve with pumped infiltration systems and put details in chapter.
Linda - Infiltration areas are smaller in size because of ability of pump to deliver a set dosing rate, spread over smaller area, infiltrates down, so don’t need as large an area if using it for both storage and infiltration.
Mike M – Is it frequent enough that we need MDCs for it?
Linda – With advent of sand filters, we see a lot fewer pumped infiltration systems. Don’t know if there’s enough reason to get rid of it or not.
Mike M – If don’t see it much, maybe it’s not an MDC, but is in chapter. Can be handled on case-by-case basis.
Annette – I’ve never seen one.
Tim – Definitely needs to stay as an option.
Bradley – At a minimum, can say it will be allowed on a case-by-case basis, but not an MDC.
Jonathan – Our earlier statement about other devices, can we just add “pumped” to it?
Linda – Where we talk about underground trenches?
Jonathan – Where we say will consider other media devices --
Annette – Where we say “infiltration devices may be buried”?
Boyd – We need to make certain that we have clause that talks about other systems may be allowed that provide water quality protection.
Annette – We’ll have a section on alternatives, proprietary devices.
Linda – Maybe this should be another general MDC?
Tim – It’s just a mechanism to get it from Point A to B -- no treatment involved. Parameters are still the same as far as the infiltration system.
Linda – With the possibility of making it smaller because of the dosing.
Bradley – For stormwater design, there may not be requirements to make sure that pump is going to perform.
Tim – How is review of pump station done at DENR?
Linda – Specify pump rate, looking at pump curve, flow switch -- that’s about it.
Linda – If trying to size infiltration system smaller because you’re using a pump, then it should be in MDCs.
Hunter – Does all this fall under rainwater harvesting? Year-round use is feeding a downstream BMP.
Tim – It’s whatever the math says.
Boyd – I like your idea of putting one statement covering all stormwater saying we can use mechanized devices if they provide detection or backup or whatever.
Todd – In BMP Manual, what is implication of maintenance of these systems?
Hunter – In agreement, need to account for all working parts of the system.
Tim – Most people do this because they can’t get separation or have bad soils. Do it when it’s their only option or else won’t develop.
Todd – Just so future consumer knows what they’re buying. Your maintenance agreement needs to specify.
Linda – Trying to allow this to also apply to cisterns?
Annette – Yes, some folks will use that if want to make infiltration system smaller.
JD – Are you adjusting the pumps or the storage/equalization system at the top of the hill?
Annette – What I’d like to see people be able to do –
Linda – It’s the pump rate. Because pump rate can be adjusted to something low, you can make infiltration area smaller because you only have to deal with low flow coming in and infiltrating it rather than gravity fed where you get everything coming in at once.
Jonathan – Did you want to define device as the receiving device?
Tim – Can’t we just say allowable and leave it at that?
Boyd – I like putting period after allowable. Then we say size of BMP may be adjusted based on the flow rate, just as information.
Tim – So first part is MDC, second part is a recommendation?
Jonathan – Keep first sentence and be done.
Annette – I think second sentence lets reviewers -- state or local government -- know that this is something that can be done.
Jonathan – That second sentence is just something to argue about. Doesn’t say anything.
Boyd – I agree, but it can apply to other devices if you have storage somewhere else, can reduce size of BMP.
Hunter – Second sentence depends on storage. Only way you reduce size of BMP is with storage device somewhere else. It just doesn’t work here. If my flow rate into infiltration basin is one CFS, volume doesn’t matter anymore, that’s how I would read that as an engineer. Where’s Linda’s ability to say you still need a storage volume in that? That’s not the intent. Leave first sentence in, but not second. Could be other guidance that speaks to reducing size of treatment device based on storage.
Boyd – It applies to many BMPs so shouldn’t be here.
Group agreed to make Item 24 a General MDC: “Pumped or gravity fed conveyances to stormwater BMPs are allowable.”
In Manual itself, we can talk about the possibility of providing storage, reducing the flow rate, and then reducing size of the BMP in the chapter.

**Item 25 - Dewatering Provision**Hunter – Dewatering pumps are allowed in other BMP manual chapters. I’m fine with a dewatering provision, but it might be a pump, not just a pipe system.
Linda – This should also be a general MDC, if it’s not already.
Hunter – Rule talks about dewatering a pond for maintenance. Do we want to add “or periodic maintenance”?
Group agreed to make Item 25 a General MDC: There should be a dewatering provision in the event of failure and for periodic maintenance.

**Item 26 – Construction**
Strike this.

**Item 27 – Construction**
Annette – I think this is already covered in general MDCs.
Strike this.

**Recommendation – Siting**
Group agreed to strike: ~~Infiltration basins should not be located on slopes exceeding 15 percent.~~

**Progress Report**
Annette – Senate Bill 734 extends the MDC deadline to Feb 1, 2015. Progress reports are due Sept 1 and Dec 1, 2014. We still have eleven practices to get through. We’re taking about two meetings for each practice. But I think some we can get through in one meeting, like wetlands. If we get through one per month, we can finish in June 2015. But if we want to meet Feb 1st deadline, need to do two practices per month.

Option 1) We could have simultaneous sessions. Someone else would need to facilitate one of the sessions. Need to make sure we get variety of stakeholders represented in each room.

Option 2) We could have longer or more frequent meetings.

Option 3) DEMLR staff could provide draft MDC to group to reduce amount of discussion [Annette points out this was someone else’s idea.]

Option 4) We can ask for more time.

Other ideas?
Robert – I don’t like the first one – defeats purpose of team that was assembled.
Jonathan – Longer meetings probably most effective – everyone’s already made the journey here. Would take less time than making it two meetings.
Todd – I think we better try to meet the deadline.
Linda – I like the third option too. The big three that we’ve done already -- those criteria can be applied to the rest of them.
Tim – Let’s pick top 4 or 5. Nobody really cares about green roofs, etc. Those can be done with cursory review.
JD – Could you take a redline approach based on what you’ve heard during these first sessions? Don’t want you to dictate to us, but I think you have an idea of what we’re going to ask. Or maybe just start a little earlier and go a little later.
Hunter – Just isolate what’s unique about each practice and focus on that.
Tim – Bioretention, wetlands, sand filters, permeable pavement, maybe dry detention -- those are five ones that need to be discussed.
Annette – [Showed example of what she drafted for Wetlands.] About half of it was brought over from wet pond chapter. Like to think of devices as families. Detention includes wet ponds, wetlands and dry detention. Filtration includes sand filters and bioretention. I think group will care about swales too.
Jonathan – Is 10:00 a.m. earliest we can meet?
Mike M – I can get here at 9:00 a.m.
Bill H – What about 9:30 a.m. to 1:30 p.m.?
Todd M – 9:30’s fine; I could go until 3:00 p.m.
JD – Would need a half hour break in there for lunch.
Marc – How about 10 a.m. to 3 p.m.?
Group agreed to meet at 9:30 a.m. to 3:00 p.m. next time. And get lunch brought in.
JD – Will you also give us a first pass to go by?
Annette agreed to bring redline drafts to meetings.
Bill H – Wetlands and swales may take more time than we think.

**SPECIAL AFTERNOON SESSION [*attendance optional*]**(Bradley was notetaker for afternoon session)Attorneys from Rules Review Commission made presentation and answered questions about rulemaking process.

**Action Items**Annette – Will propose changes ahead of next meetings and bring redline versions to future meetings.
Annette – Send Team additional homework in 2 weeks.
Team – Review wetlands and dry detention chapters and additional homework as assigned.

**Next Meeting – September 22, 2014 – Stormwater Wetlands and Dry Detention
Meeting will go from 9:30 to 3:00. Bring cash if you want to order lunch.**