

MEETING DETAILS

- Meeting Date/Time: January 13, 2021 (via Zoom)
- Attendees: See Q1 in poll results
- This document: Meeting details
Meeting notes
Stakeholder Poll Results
- Related: Video recording – Available at www.mhfd.org (or on our YouTube Channel)

MEETING DISCUSSION NOTES

TOPICS (POLL ?s)	DISCUSSION NOTES & COMMENTS
Pre Chapter Rewrite - Coordination	<ul style="list-style-type: none"> - Holly Piza: MHFD has been looking at Media specification in regards to Bioretention and Sand Filters - A year ago, hosted large consultant meeting / info share on how to better support vegetation, infiltration, and improved water quality treatment - Ongoing - Bioretention Research Project – examined over 30 sites in region – want to understand correlation between infiltration and percent cover as well as impacts on vegetation health
Introductions/ Primary Roles	<ul style="list-style-type: none"> - Scott Struck (Geosyntec) – part of team and shared literature review that related to Bioretention and Sand filters (will be shared in addition to meeting minutes) - Cross Section – all areas/parties/groups represented
Interest in Attending Today	<ul style="list-style-type: none"> - Education – understanding what the specifications are - Lessons Learned – District focuses on sharing
How are Filtration SCM's encouraged by the Local Government	<ul style="list-style-type: none"> - Boulder – promotes filtration BMP's first - Candice Owens (from Boulder) Tiered policy starts with run off reduction and ends with proprietary Devices – still a work in progress - Scott Struck – Experience with municipalities- Uncertainty of how frequent needs to be maintained, how long they will last, etc. - Michael Grabczyk (Parker) Site maintenance concerns – restorative maintenance
What prompts you to consider Bioretention / Sand filters over an alternative SCM	<ul style="list-style-type: none"> - Smaller sites is common theme - Holly Piza – they can still be appropriate on a larger scale - Andrew Earles (Write water) Industrial Sites - Aesthetics plays a role- landscape and detention/ water quality credit

TOPICS (POLL ?s)	DISCUSSION NOTES & COMMENTS
<p>What are your areas of concern in implementing Bioretention / Sandfilters</p>	<ul style="list-style-type: none"> - Long term water quality benefits - Uncertainty – more experience with EDB’s - Denver – experienced media concerns
<p>How are the bioretention / sandfilters being maintained/ and by whom?</p>	<ul style="list-style-type: none"> - Denver – Built a lot recently, moving to maintain more in house, but a lot still in warranty <ul style="list-style-type: none"> - New wastewater team will manage - Boulder – still a work in progress, trying to bring moving parts together to create a knowledge base
<p>What is your experience with the existing seed mix provided in USDCM?</p>	<ul style="list-style-type: none"> - Holly – used @21st and Iris site, established over one growing season and has done well
<p>When do you find Sand filters useful, and what type of application?</p>	<ul style="list-style-type: none"> - Ikea is a good example, they have 2 - for parking lot run off and for roof run off - Near highways - Transportation
<p>Where / when have you deviated from Criteria (in regards to Bioretention/Sand Filters</p>	<ul style="list-style-type: none"> - It does not fit - Shavger Rekani – recently had Public works project, implemented more in order to get more volume within the media, based on tributary area - Modifications to media to achieve higher infiltration
<p>What are your recommendations for improving Criteria?</p>	<ul style="list-style-type: none"> - Training opportunities - Jessica Thrasher (on call)– Colorado Stormwater Center offers training <ul style="list-style-type: none"> - Working on 2021 training schedule - Jessica.Thrasher@coloradostate.edu - Website → http://stormwatercenter.colostate.edu/

TOPICS (POLL ?s)	DISCUSSION NOTES & COMMENTS
<p>Summarize Meeting re: Criteria Rewrite: (Andrew Earles, Wright water)</p>	<ul style="list-style-type: none"> - Update from MHFD – active research projects going on - Main reason people were attending today is to learn from other’s experience - 2 Approaches to encourage filtration based BMP’s : <ul style="list-style-type: none"> o Carrot – encourage use of infiltration through promoting benefits – aesthetics, water quality, etc. o Stick – discourage from using other BMP’s that are not appropriate - Bioretention is most commonly applied on small sites, but criteria is not limiting use to just small sites - Trees – in past they have been discouraged in bioretention facilities, but they will not be discouraged in Criteria rewrite - Irrigation versus Non Irrigated areas - Main Concerns – Uncertainty with design, long term maintenance, long term performance - Areas for Improvement <ul style="list-style-type: none"> o Seed mixes and Vegetation o Media o Supply of media

STAKEHOLDER SURVEY – POLL EVERYWHERE RESULTS

Q 1: Introduce Yourself (Name, Organization/ Place of Work)

- Chris French, Bio Clean Environmental
- Michael Grabczyk, Town of Parker
- Jeff Rice, El Paso County
- Jane Clary, Wright Water Engineers
- A.J. Schwidder, Upstream Technologies
- Jim Wulliman, Muller Engineering
- Nicole Horst, Wenk Associates
- Brian Wethington, City and County of Denver
- Joshua Eldridge, Great Ecology
- Scott Struck, Geosyntec
- Kelli Schwab, Wenk Associates
- Laura Hinds, MHFD
- Jim Watt, MHFD
- Jim Lenhart, Stormwater Northwest
- Jeff Williams, City and County of Denver
- Laddie Fromelius, StormTrap
- Sam Miller, City of Aurora
- Tracy Bolger, Muller Engineering
- Troy Moore, Mile High Company
- Nick Trujillo, S.A. Miro
- Jessica Thrasher, Colorado Stormwater Center, CSU
- Sara DeGroot, MHFD
- Brad Robenstein, Douglas County
- Candice Owen, City of Boulder
- Jake Moyer, City of Westminster
- Brent Kaslon, Valerian
- Colin Bell, City and County of Denver
- Dan Dodson, Bio Clean
- Derek Rapp, Peak Stormwater Engineering
- Taylor Rohde, S. A. Miro, Inc
- Craig Fairbaugh, Contech
- Jeremiah Unger, CDOT HQ
- Tiffany Clark, SEMSWA
- Shavger Rekani, Rick Engineering Company
- Mark West, Harris Kocher Smith
- Selena Klosowski Denver Wastewater Management Division- construction/maintenance
- Sue Liu - Arapahoe County
- Jeff Rice - El Paso County
- Paul Thomas - Stream Landscape Architecture
- Michael Grabczyk - Town of Parker

Q2: What is your primary role?

Response	Count
Designer	13
Policy and regulation	9
Reviewer	8
Research/Academia	2
Maintenance	1
Construction/Contractor	1
Total	34

Q3: What is your interest/reason in attending today’s Meeting?

- Insight on media trends and needs to specify
- To better understand the direction of proposed design requirements.
- Discussing sourcing of MHFD media blend and limitations with local suppliers (not being able to meet specifications)
- Education (2)
- Underground sand filters
- Provide input to support an update that supports design in our community
- Improve maintenance of bioretention and sand filers.

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- Understanding the need for specification of media and how to apply it for QA/QC and insitu testing
 - Local government - criteria development, review, construction, and maintenance
 - Tracking criteria updates, how to best design these facilities
 - The bio-retention media research and the availability (of lack of) in the industry.
 - Alternative MS4 compliance pathways for bioretention: a TSS standard or a rate-based standard
 - Discuss evolving a more vegetation supportive media blend for bioretention.
 - Updates on bio retention design
 - Better understand industry trends
 - To see new improvements to guidance and how it will be implemented
 - Listen to participants
 - Keeping up on the new research on bioretention and learning how the District is considering the data.
 - Design, media depth guidelines, where to source - goal of this meeting
 - Long term maintenance procedures and costs
 - Understand Maintenance. Maybe improve it
 - Hear input from stakeholders--
 - Staying up-to-date on recommendations.
 - Learn about any lessons learned
 - Improve media QC enforcement
 - Hear others' experiences with bioretention design criteria

Q4: How are Filtration SCM's encouraged by the Local Government?

- Defer to MHFD guidelines discouraging other SCM's
- We definitely suggest them but we don't have an incentive program.
- Somewhat discouraged on anything but small infill sites.
- In the review process when they would be more effective than other SCMs
- They fit well on smaller sites.
- Less desirable. Uncertainty with operation and maintenance.
- Strongly encouraged but sometimes over encouraged in some land use or economic situations
- Through a hierarchy of accepted SCMs - infiltration, biofiltration, mechanical, etc
- Not used as often as EDB due to typical tributary areas.
- Recommendations through the review process
- Limiting other bmp's?
- Regulations and guidelines
- Aesthetics

Q5: What prompts you to consider Bioretention / Sandfilters over alternative SCM's?

- Space (2)
- It was required in the watershed of an impaired urban creek.
- When landscape aesthetics is important (for bioretention).
- Where distributed treatment can be beneficial to improve WQ over a single larger/regional treatment (on a larger scale)

- Adding tree canopy to a streetscape for peds/bikers
- Small footprint that can provide WQ and flow control
- Appropriate application for the land use is key. No SCM is universal. Economic and Land Use considerations need to play a role in decision making
- Smaller sites and incorporating them with landscaping
- Downstream of more source point pollutants, dog parks, horse stables, etc.
- Aesthetics, added filtration, site constraints
- The guidelines promote this?
- Multiple additional benefits (vegetation, tree canopy, aesthetics)
- Sediment load
- The level of suspended or dissolved contaminants within the watershed
- Small upstream subcatchments where EDB orifices would be very small.
- Right of way projects lend themselves toward smaller control measures
- Limited tributary area, as defined by MHFD criteria.
- Smaller sites (2)

Q6: What are your areas of concern in implementing Bioretention / Sand Filters?

- Resident expectations of aesthetics
- Recent testing on MHFD media components being outside of spec (pH and phosphorous in particular)
- How frequent to restore based on heavy metals
- Timing of installation, silt contamination from upstream development
- Proper design, installation and maintenance. Also, there is a general lack of appropriate testing on the media, which can result in nutrient and metals leaching.
- Providing enough nutrients for establishment and growth of vegetation
- Criteria are not defined for when filter media needs to be replaced or when vegetation needs to be changed/maintained.
- Availability of media
- Propagation of noxious weeds (maintenance), Accumulation of trash and debris including sharps and pathogens
- Vegetation - even with irrigation it is hard to establish vegetation
- Ensuring maintenance of vegetation is done correctly, plant selection based on available water
- Long term performance and aesthetics (vegetation health.), maintenance
- Properly constructed
- Proper installation and longer term performance
- Designing for maintenance
- Vegetation establishment, ensuring proper filtration indefinitely
- ensuring that they get installed with the right media and they it is not compromised during construction by construction activities
- Still seeing the floating mulch and poor inlet/forebays, dead /sparse vegetation
- Roadway pollutant loads
- Long term aesthetics
- Construction methods and inspection - properly constructing without over compacting
- Good design, selection of proper media and vegetation, CONSTRUCTION.

- Maintenance and initial cost
- Maintenance and cost and standards and sourcing material
- Long term performance and maintenance

Q7: How are bioretention facilities being maintained / and by whom?

- In St. Louis, Missouri, almost all of the bioretention and sand filters are on private property. The Metro Sewer district requires inspection reports on a quarterly basis. Inspection and maintenance is typically provided by private contractors.
- Landscape companies
- For private developments - HOAs and owners (typically contracted landscapers) maintain per an OM Manual required with the design documents and recorded against the property
- Clean Water Services (Hillsboro, OR) require the companies doing maintenance to get certified after taking a 2 day training class.
- I believe weed control is a concern for operations personnel
- Private land owners (commercial properties), municipal government
- on public facilities, through BID/GID agreements in some cases, but we also have a CCD WW Ops team that will be dedicated to maintaining bioretention
- Metro District
- Private owners, public works staff on a few new County facilities
- Private BMP maintenance service companies hired by HOA
- Or not being maintained both public and private.
- commercial property owner or HOA

Q8: What is your experience with the existing seed mix provided by UDSCM?:

- Have used sand-grow sod.

Q9: When do people find Sandfilters useful, and what types of applications?

- Industrial areas where aesthetics aren't as important
- Areas where aesthetic is not a concern
- CDOT uses sand filters over bio-retention. This is due to the nature of highway effluent
- Sand filters are often used where irrigation is not available or not recommended such as within an airport.
- In remote locations when there access to irrigation is limited
- Used near highways
- I have used extensively in underground vaults
- Industrial sites
- I like them. Applications in parking lots that are hidden (typically a grate)
- In combination with underground detention
- IKEA used sand filters
- Underground?

Q10: Where and when have you deviated from Criteria?

- Increase in 1' WQCV depth over media
- When a concrete wall and liner were not warranted. Filter media

- Seed mix and/or media specification
- Cost
- It won't fit
- Project specific media

Q11: What are your recommendations for improving Criteria?

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- Focus on media sourcing, storage, handling and installation
- Secure consistent media suppliers--
- Very hands training for maintenance crews. Bilingual educational materials for landscape crews
- Use a tiered crediting approach that ties credits to maintenance and level of media QC
- Expand on seed mix, plantings. More outreach for filter media suppliers. O&M manual guidance
- It would be nice to see a list of different flowers/shrubs that could be incorporated that work with the specific growing media.
- Very specific O&M plan guidance that should be done in design
- Lots of pictures and examples
- US the new ASTM E64 main committee to develop standards for media, QA/QC , evaluation and even design
- Include as much of the research based recommendations from the Geosyntec review as is feasible
- Not necessarily within the criteria - training opportunities for those in charge of maintenance

For any comments or questions about these meeting notes, please contact one of the following MHFD staff members (or our supporting consultants) managing the V3Ch4 criteria update via email at:

- Morgan Lynch, PE, CFM (mlynch@mhfd.org)
- Holly Piza, PE (hpiza@mhfd.org)
- Brik Zivkovich, EI, CFM (bzivkovich@mhfd.org)

Other Updates from Stakeholders/Attendees

<p>Jessica Thrasher - Colorado Stormwater Center:</p>	<p>http://stormwatercenter.colostate.edu/training/training-information/ - The 2021 Training schedule will be available by the end of January. Please contact Jessica Thrasher with any questions Jessica.thrasher@colostate.edu</p>
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Relevant Comments from Zoom Chat (*Attendees were added to list in #1)

*0:25:37	Sean Klosowski:	Selena Klosowski Denver Wastewater Management Division- construction/maintenance
*0:25:55	HEDC62:	Sue Liu – Arapahoe County
*0:26:30	Jeff Rice:	Jeff Rice – El Paso County
*0:27:08	Paul Thomas:	Paul Thomas – Stream Landscape Architecture
*0:27:52	Michael Grabczyk:	Michael Grabczyk – Town of Parker
0:29:19	S. Klosowski:	what is the link for the poll
0:29:34	Morgan Lynch:	Please see the top of the slide
0:29:46	Morgan Lynch:	PollEv.com/mhfd303
0:30:05	5 Craig Fairbaugh:	Holly - will data and results from those 30 BRT sites be shared with the public?
0:30:55	5 Craig Fairbaugh:	Thanks!
0:41:27	S. Klosowski:	not sure we have done restorative maintenance. I've been curious if we should have
0:41:47	Laddie Fromelius:	ask again if anyone has maintained a sand filter
0:43:11	Jim Lenhart:	I have seen biofilms clog underdrains on filters. Land use was fast food. Completely clogged with a clear bacterial gel.
0:45:01	5 Craig Fairbaugh:	We see a lot of issues nationally with bioretention construction. Contractors often confuse bioretention as a landscape feature and don't follow specs closely
0:47:53	Jeremiah Unger (CDOT HQ):	Morgan, when does a joke become a "Dad" joke?
0:48:34	A.J. Schwidder:	It was required in the watershed of an impaired urban creek.
0:49:30	Laddie Fromelius:	when it becomes apparent
0:50:05	Jeremiah Unger (CDOT HQ):	Nice!
0:50:40	Brian Wethington:	I don't think my responses are coming through the poll
0:50:52	Colin Bell - CCD:	^ same. It seemed to lock?
0:50:57	Brian Wethington:	where distributed treatment can be beneficial to improve WQ over a single larger/regional treatment (on a larger scale) multiple additional benefits (vegetation, tree canopy, aesthetics)
0:51:05	Brian Wethington:	locking out the CCD staff I see :)
0:51:31	Colin Bell - CCD:	Adding trees to streetscapes
0:55:13	Nicole Horst:	There is a sand filter/bioretention area at Huston Lake Park that was installed 15+ years ago. It has had removal of vegetation over the years. Not sure how it is functioning.
1:03:01	Laddie Fromelius:	is there a suggested effluent limit for sand filters?
1:05:20	Jeremiah Unger (CDOT HQ):	Yes
1:09:08	5 Craig Fairbaugh:	Laddie: latest BMP database summary shows sand filters can have a median TSS effluent under 10 mg/L
1:13:08	Mark Schutte:	the reactions go away after ~30 seconds, fyi

1:13:38	Dan Dodson:	For the previous question on maintenance, here is the Bio Clean maintenance team that was mentioned... https://biocleanenvironmental.com/maintenance
1:15:57	Jane Clary:	Regarding Craig's comment on performance, here is link to 2020 BMP Database Analysis with updated summary statistics: https://www.waterrf.org/system/files/resource/2020-11/DRPT-4968_0.pdf
1:23:08	5 Craig Fairbaugh:	More water depth on top of media can compact media...which also promotes increased maintenance
1:26:51	Michael Grabczyk:	Thank you Jessica!
1:29:06	Jessica Thrasher – Colorado Stormwater Center:	http://stormwatercenter.colostate.edu/training/training-information/ - The 2021 Training schedule will be available by the end of January. Please contact Jessica Thrasher with any questions Jessica.thrasher@colostate.edu
1:37:13	Brian Wethington:	Brings up a good point; education and guidance around life-cycle (not just costs) of a site-scale SCM. Portland has good data that facilities may be able to last 25, 30, or more years with minor maintenance activities that span the life of a tree.
1:46:31	Paul Thomas:	Re Irrigation: Irrigation for establishment is critical, and is a sustainable practice when you think about the costs and impacts of having to replace plants, etc.. The ability to irrigation during droughts is also important. The need for irrigation will depend on the location/visitibility of the site, etc.
1:46:36	Laddie Fromelius:	second!