Greater Greater Washington
The Washington, DC area is great. But it could be greater.

To stop sewage from overflowing into the Anacostia, Nannie is digging in

by Kristan Uhlenbrock • June 10, 2015

She is smooth, round, and has teeth so hard they can chew through rock. She hangs out down by the river, waiting for when she gets the thumbs up signal. Her name is Nannie. Standing 26 feet tall, she's a tunnel-boring machine that is waiting to drill a tunnel from RFK stadium, along and under the Anacostia River, where she will meet up with another part of the tunnel currently under construction.

Nannie sits ready and waiting near the parking lot of RFK Stadium, next to the Anacostia River. Image from the author.

Nannie's 96 cerulean blue grinding teeth glisten in the sun. Resting only feet away is a 109-foot deep shaft, where she will begin her descent into the underworld to dig through the compacted layers of clay and sediment material.

Named after Nannie Helen Burroughs, a prominent early 20th century African-American educator and civil rights activist in DC, Nannie is an essential component of the Clean Rivers Project, a massive engineering endeavor in the District that will fix the city's sewer system's overflow problems.

Nannie's task is to create a new tunnel large enough that the combined sewer system, which makes up a third of the District's sewer, will not overflow during heavy rainfall or snowmelt events.

Currently, heavy rains result in sewage, stormwater, and other runoff flowing into the Anacostia. For example, between October and December of 2014, the Anacostia River experienced multiple overflows at stations along its shore. There were 12 overflows on the south side of the river by Anacostia Park, which is the most of any site. Eight happened directly across, at the Navy Yard.

The Anacostia River is at the backdoor of the Nation's capitol, but is often referred to as "The Forgotten River." Once complete, the Clean Rivers Project will cut sewage and stormwater overflow by 98% in the Anacostia River and provide similar reductions for the Potomac River and Rock Creek, paving the way for a cleaner, healthier ecosystem.

Beyond runoff, the Anacostia is also polluted with chemicals and trash

Stormwater and sewage overflow is just one of many problems the river is experiencing. Years of neglect have led to a river so polluted that it's dangerous to get into the water or eat the fish.

According to a 2012 study commissioned by local, District, and federal groups, approximately 17,000 residents might be eating these fish. Some, like the brown bullhead catfish, have red fleshy tumors on their lips, which is a visible sign something is wrong. But not all of them have visible deformities, and what's going on under the skin can be just as alarming.

The same can be said for the river. After a heavy rain storm the river is visually polluted. Trash floats all along the river and collects along its shores, and the stench of waste is too hard to ignore.

Nannie should help with those problems

The Clean Rivers Project will reduce overflows, which will also help with part of the trash problem. But the river will still be polluted by heavy metals in sediment, upstream sources of pollution, and runoff that doesn't get captured by the sewage system.

Jim Foster, the president of the Anacostia Watershed Society, wants to get back to the root cause of all these problems. He argues that more needs to be done if we want to make the river "swimmable and fishable by 2025" - a motto he and others are using as a goal post.

Combined sewer systems are found in many other US cities, including the District. These types of sewers consist of a central pipe that serves as a catchall for storm runoff and household and industrial sewage. During heavy rain events, the untreated sewage runs into local waterways. Combined sewer systems are found in the older parts of the city, flowing from the northern boundary through the heart of the District.

Nannie's tunnel and the Clean Rivers Project are expected to fix this problem by creating a larger sewer drain to capture all of the waste. Nannie will "drive the most important, ground—or better yet - water-breaking improvements to the Anacostia in the last century. And we will do it in the next 10 years," said George Hawkins the chief of DC Water and Sewer Authority at a public event in February.

Here's how Nannie will work

Nannie is a beast, her cutting head spinning one to two rotations per minute. Nate Wageley, an inspector with DC Water, described the process. Nannie "will basically rip the soil into shreds, or cuttings. And if you hit a boulder, there are discs that will cut them up into little fragments."

The excavated material is then softened with a foam, producing a taffy-like substance that gets transported on railway carts out of the tunnel and offsite. Nannie will travel at approximately 500 feet a week, eventually excavating a 12,500-foot tunnel. When she gets the green light, the engineers expect her to finish the tunnel in less than a year. Once complete, the foot thick concrete tunnel will have a lifespan of 100 years.

Nannie is expected to begin tunneling this summer and her portion of the Clean Rivers Project will be completed by 2018. The longer-term plan for the District, including projects along the Potomac River and Rock Creek, is currently scheduled for completion in 2025 unless it gets amended to accommodate proposed green infrastructure.

Community advocates have concerns

Some environmental advocates are concerned that the Anacostia portion of the Clean Rivers Project is solely focused on a hard engineering solution. The tunnel will improve water quality, but it does not include other softer, aboveground, measures, like green infrastructure, which would benefit residents by increasing property values. Foster worries that the communities around the Anacostia River are not seeing similar investments in green infrastructure like those planned for the Potomac River and Rock Creek areas.

In May, DC Water proposed green infrastructure on 498 acres for the Potomac River and Rock Creek neighborhoods under the Clean Rivers Project. But improvements of similar proportion have not been proposed for the communities around the Anacostia River.

"The [engineering] benefits don't accrue to the community. Planting trees and doing rain gardens and landscapes improves the assessed value of a community, it raises the aesthetics and helps improve the infrastructure that people use every day," Foster says. "They get the gold mine, and we get the shaft."

Despite concerns about equity of the project, the District is taking serious steps to clean up its waterways. "Everybody has to do a little bit. Everyone has some skin in the game. In the end of the day, it's not about the river. The river represents what's happening in the community," says Foster.

Kristan Uhlenbrock is a science writer and outdoor adventurer. She lives in southeast DC and can often be spotted on a paddle board cruising the Anacostia River. An ocean scientist by training, she moved to DC in 2010 to work on at the intersection of policy, science, and communication.
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Comments

Careful...some people might claim this is "the nanny state" in action LOL

by Dave G on Jun 10, 2015 10:53 am • link • report

Tunnel boring machines which should be digging tunnels for rail are digging tunnels for your excrement. We've got to do better.

by Redline SOS on Jun 10, 2015 11:01 am • link • report

Just to make sure I follow this, what you are calling a "tunnel" is really a large underground storage tank, right?

DC will continue to mix sewage with stormwater, but now all of it will go to Blue Plains instead of into the river on rainy days.

And there is no plan to ever separate the combined system, even when areas are redeveloped, aside from maybe a few spots so small that you did not bother mentioning it.

That's what I infer from this, but just wanted to make sure.

by JimT on Jun 10, 2015 11:01 am • link • report

@JimT: "And there is no plan to ever separate the combined system, even when areas are redeveloped, aside from maybe a few spots so small that you did not bother mentioning it."

Don't think separating them will do any good. Runoff has to be treated too.

by tondo on Jun 10, 2015 11:17 am • link • report

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storm run off does not have to be treated. In places with completely separate stormwater systems, there is usually no attempt made to run it to treatment plants.

In Alexandria, which has a similar problem to DC, but only in the oldest areas - Old Town and I think Del Ray - a similar project is being done - but only in those areas with the combined system.

Seperating is not done, IIUC, because it is much more complex and costly, than storage for treatment. Though from what I have seen of the planning for Old Town, there will be some seperation where it is easier, and the role of that in the plan, though small, is not trivial.

by CrossingBrooklynFerry on Jun 10, 2015 11:21 am • link • report

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@Redline; DC could easily finance new rail tunnels. Say $1000 an extra fee for everyone in DC. That is close to what DC water has done.

What a giant waste. God only knows how they plan on cleaning up the various industrial chemicals sitting on the bottom.

by charlie on Jun 10, 2015 11:25 am • link • report

@CBF: "storm run off does not have to be treated. In places with completely separate stormwater systems, there is usually no attempt made to run it to treatment plants. "

That is just wrong. Treatment of runoff is the basis for the "rain tax".

by tondo on Jun 10, 2015 11:28 am • link • report

"The excavated material is then softened with a foam, producing a taffy-like substance that gets transported on railway carts out of the tunnel and offsite."

Where the hell is that chemical laden pollutant mess going?

by Um, what? on Jun 10, 2015 11:29 am • link • report

"Where the hell is that chemical laden pollutant mess going"

Landfill.

by tondo on Jun 10, 2015 11:31 am • link • report

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storm run off does not have to be treated.

Storm runoff is terrible for creeks and rivers. Rain hits hot pavement and then hot water carries oil and other contaminants from streets and parking lots straight into the body of water. Both the heated water and contaminants are life killing.

Storm runoff is in no way benign.

by Tina on Jun 10, 2015 11:33 am • link • report

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storm run off does not have to be treated.

That depends on what you mean by 'have to.'

Legally required to treat it? Not always. However, if you actually want your storm run-off to be clean, then yes - you need to treat it in some fashion, and there are

more and more legal mandates to do so.

But if you're arguing that you don't 'have to' treat stormwater in order to get clean rivers, that's not true at all. Stormwater runoff can be very, very dirty.

As Tondo notes, the infamous Maryland 'rain tax' is all about charging for (and raising money to treat) stormwater runoff so that such runoff will comply with the Clean Water Act.

The reason Phase 2 of the Silver Line is delayed is due to compliance with new regulations on treatment of stormwater runoff:
http://wamu.org/news/14/09/16/silver_line_phase_2_could_face_delays_from_stormwater_regulations

by Alex B. on Jun 10, 2015 11:36 am • link • report

...in addition to storm runoff being very dirty it is also hot (in the summer) which is devastating if not extremely stressful to many plants and animals.

by Tina on Jun 10, 2015 11:39 am • link • report

Tina

I did not say it was benign. However AFAIK no jurisdiction with separate stormwater systems treats its stormwater. Some attempts are made to minimize on street contamination, or to reduce pervious surface to slow and filter flow. But AFAIK no one hold treatment of stormwater to be BC positive (we live in a world of limited resources and higher priority projects for improving water quality)

Treatment is done where systems are combined - because it is generally more cost effective to do so than to separate systems.

Note that treatment itself uses energy and has environmental consequences.

by CrossingBrooklynFerry on Jun 10, 2015 11:39 am • link • report

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Alex B

Is Maryland planning on running all (or most) storm water runoff through full treatment plants such as residential wastewater receives?

Are they planning on combining currently separate sewage and stormwater systems?

that is what is relevant to JimT's question, and tondos response.

by CrossingBrooklynFerry on Jun 10, 2015 11:42 am • link • report

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@CBF - all those bioswales and rain gardens are indeed treatment of storm runoff, and in a cost-effective way. Maybe you personally think "storm water doesn't need to be treated" but there are tons of ppl who disagree, and for very good reasons.

by Tina on Jun 10, 2015 11:44 am • link • report

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http://www.cwp.org/maryland-rain-tax-debunked-stormwater-fees-are-common-equitable-way-to-pay-for-reducing-polluted-runoff

"Stormwater fees are used to construct management practices in strategic locations in the landscape to slow down and filter pollutants from runoff in order to provide cleaner water, reduce flooding and erosion, protect infrastructure, and revitalize communities."

slowing down and in place filtering. A far cry from running storm water through a municipal wastewater treatment plant.

by CrossingBrooklynFerry on Jun 10, 2015 11:45 am • link • report

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Maryland is using, among other techniques, the low tech cost effective treatment of permeable surfaces, bioswales and rain gardens.

by Tina on Jun 10, 2015 11:46 am • link • report

"@CBF - all those bioswales and rain gardens are indeed treatment of storm runoff, and in a cost-effective way. Maybe you personally think "storm water doesn't need to be treated" but there are tons of ppl who disagree, and for very good reasons."

I am all for rain gardens and bioswales. By "does not need to be treated" I meant does not need to be treated at a wastewater treatment plant. Given the context here was discussion of seperating wastewater and stormwater, and the expenses DC is undergoing because it has a legacy combined system, I am genuinely puzzled why what I said was not clear.

by CrossingBrooklynFerry on Jun 10, 2015 11:47 am • link • report

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Tina

IE Md is NOT reversing over a hundred years (?) of best practice of separating stormwater and sewage, where possible.

by CrossingBrooklynFerry on Jun 10, 2015 11:49 am • link • report

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I think you folks are quibbling over the meaning of "treatment" Running stormwater through a rain garden may now technically be called treatment, but that is not what I think most laypeople in this context consider it to be. Note the problem motivating the huge expenditure - because combined flow means greater flow than a municipal wastewater treatment plant can handle during peak storms, waste water goes to waterways untreated - the untreated there meaning not treated at a wastewater treatment plant.

by CrossingBrooklynFerry on Jun 10, 2015 11:51 am • link • report

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@CBF -what I and others took issue with was your assertion that storm water "doesn't need to be treated". Those low tech, cheap treatments of bioswales/rain gardens/permeable surfaces are treatment. They are being pursued for a reason.

by Tina on Jun 10, 2015 11:55 am • link • report

I think you folks are quibbling over the meaning of "treatment" Running stormwater through a rain garden may now technically be called treatment, but that is not what I think most laypeople in this context consider it to be.

Well then consider this a teachable moment. Not all "treatment" is high tech and expensive.

by Tina on Jun 10, 2015 11:56 am • link • report

There are three problems with combining sewage and stormwater. Sewage is far worse than stormwater, so whenever there is too much stormwater a combined system dumps the sewage into the river. That's the problem we are dealing with here.

A second problem is that how one should treat sewage is generally different than how one should treat stormwater. One can more efficiently treat each if they are each separately sent to the type of treatment designed for such a waste stream. It costs a lot more money to send every drop of rain through Blue Plains than to only send what goes down the drain to Blue Plains and treat the stormwater with whatever it needs, which may be little more than settling ponds.

A third problem is that mixing the different wastes can harm the treatment of one or the other. A lot of toxic metals from runoff means that the sludge will probably have toxic metals, and not be as good for gardens, for example.

So there would be some benefit to separating the two types of wastes, though of course that would be costly. But I don't see why it can't be a long-term goal achieved gradually through the inevitable redevelopment and replacement of existing infrastructure.

by JimT on Jun 10, 2015 12:02 pm • link • report

Consider this a teachable moment in how to communicate more clearly to the public, especially when the context of treatment was why stormwater in DC will continue to run through Blue Plains, which is a high tech, expensive form of treatment.

Note at least in alexandria, these are not seperate - IIUC an element being considered for old town is rain gardens and green roofs, for stormwater that would STILL go to the expensive High Tech wastewater treatment plant - but more slowly, so helping with the peak storm plant capacity problem.

by CrossingBrooklynFerry on Jun 10, 2015 12:02 pm • link • report

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My understanding of "treatment" means "to convert into a more environmentally benign discharge." You a free to devise any method, regardless of expense or sophistication. What matters is if it works.

by tondo on Jun 10, 2015 12:05 pm • link • report

@JimT: how would it cost to dig up every single street, reconnect some 240,000 sanitary connections at $1000/foot, and put in a separated system? $3B seems cheap.

by tondo on Jun 10, 2015 12:09 pm • link • report

Jim T

IIUC the vast majority of costs at a big waster water treatment plane are fixed costs - capital, and the operating costs to run it. Changing the timing of flows addresses the need to add capacity and increase those costs. The purely variable costs of running some more water through a plant with capacity are pretty low, IIUC.

As for change with redevelopment, speaking for Alexandria - the areas that have been added to the sewer system since sometime before WW2 (1920? I am not sure) have all had seperate systems. Potomac Yard was a rail yard, and I presume did not have a full combined systems. AFAIK the only areas with the combined system are Old Town and Del Ray (and I am not sure about Del Ray) None of those are being rebuilt from the subsoil up - a few new buildings are going in on select parcels. That does not, AFAIK, make it easy to separate the systems. You have entire networks that need to be seperated. Not only are the financial costs high, but the disruption to streets, noise, etc, is as well. And note, such construction projects use energy, energy intensive inputs, etc. They are not 100% benign.

I am far from convinced that attaining complete separation is a viable goal. But the kinds of "treatment" that Tina mentions, can also, IIUC, lessen some of those concerns.

by CrossingBrooklynFerry on Jun 10, 2015 12:09 pm • link • report

...benefit to separating the two types of wastes, though of course that would be costly. But I don't see why it can't be a long-term goal achieved gradually through the inevitable redevelopment and replacement of existing infrastructure.

Agree.

by Tina on Jun 10, 2015 12:10 pm • link • report

So there would be some benefit to separating the two types of wastes, though of course that would be costly. But I don't see why it can't be a long-term goal achieved gradually through the inevitable redevelopment and replacement of existing infrastructure.

The challenge is that you can't really slowly phase in that kind of separation. And since you can't easily phase it in (for any given section of the sewer-shed, you're all in to separate or not), and you have a consent decree to control CSO events right now, a group like DC Water has little choice but to implement the deep tunnel system.

And once you do, there's far less benefit to separate storm and sanitary sewers at the source.

by Alex B. on Jun 10, 2015 12:13 pm • link • report

@CBF. Even if it is true that the variable costs are small compared to the capital costs, there is still a huge cost to sending all that stormwater to Blue Plains since capacity has to be sized to include all that water. And of course pumps do cost something to run, and the bugs are not equivalent to a titration where concentration is almost irrelevant.

Street drains eventually are rebuilt, though it may be on the order of once a century. That's when one can put in a dual pipe system. The actual separation of waste streams can occur when replacements are done next to areas that already have separate systems. Possibly when large water mains are redone is another time to consider it, even if some pipes will not be used for a few decades.

Logically this would be a nearer term priority for the very low areas that will be below the rising sea level in a few generations. Given the occasional opportunity for sewage to back up into the street, the benefits of separating the systems will be greatest in the very low areas.

by JimT on Jun 10, 2015 12:30 pm • link • report

@AlexB: By "long-term" I mean on the order of a century, not the time frame of a consent decree.

by JimT on Jun 10, 2015 12:31 pm • link • report

"Even if it is true that the variable costs are small compared to the capital costs, there is still a huge cost to sending all that stormwater to Blue Plains since capacity has to be sized to include all that water. "

No it doesn't. That is what the role of storage tanks ia. You size the treatment plant for your wastewater flow, plus a small rain event. IIUC, when you get a big storm, the storage tanks hold the water and you release it to treatment when the capacity is available (non rainy days) The storage tanks (combined with green infra) make it possible to not add capacity for storm water.

As for replacing pipes, IIUC they now line pipes - much cheaper than a full on replacement. And again, you have to add an entire parallel network which can be quite costly. With the exception of neighborhoods immediately adjacent to a suitable body of water - there you can do a separate stormwater systems at less cost. Again, IIUC that is what Alexandria is looking at for a few parts of Old Town - but not for all of Old Town - when we say adjacent, we really mean very very close.

by CrossingBrooklynFerry on Jun 10, 2015 12:40 pm • link • report

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@CBF: I don't see why you don't think that the capacity of Blue Plains needs to be a lot greater if it treats stormwater than if rainwater all does to a separate

You just said that the treatment plant is sized to consider a small rain event, so already that means that the capacity is greater than if runoff was in a separate system. So even today the capacity needs to be greater than if the systems were separate.

As to whether the underground storage tanks will require additional capacity, that is a question of relative magnitudes. I guess the wet-dry fluctuations that it is able to deal with can accommodate the additional low flows from when the tunnels are emptied.

As you pointed out in a different context, no one is going with combines systems in new areas where separation is feasible. Aside from areas near a waterway, the obvious candidate would be flood-prone places where there would be an independent justification for improved drainage. If we allow parts of downtown DC to go below the level of the rising sea, gravity drainage (including through the water table on the mall) will no longer work so a much stronger drainage system will be needed anyway.

by JimT on Jun 10, 2015 1:58 pm • link • report

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jimT

Quite honestly I do not know exactly how Blue Plains is sized. One could size such a facility simply for maximum waste flow and zero rain flow I suppose. In that case the additional flow over time as storage tanks are emptied could mean more capacity is needed, or not, depending the day to day fluctuations in waste water flow - those

are large enough, it might be possible to add the storage outflow on low waste water days and need zero additional capacity. However in either the case where some waste water flow does not vary enough, or you size the capacity for a small rain event, in both those cases the added capacity would be small, and not likely large enough to justify complete system seperation.

Where very low lying areas mean particular drainage issues, perhaps that changes the BC calculation. I am not familiar with that.

by CrossingBrooklynFerry on Jun 10, 2015 2:25 pm • link • report

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The amount of rain that pours off my roof in an average June thunderstorm is more than what we send down the drain all summer. How per-capita runoff in DC compares with the runoff of my roof, I can not say.

by JimT on Jun 10, 2015 2:36 pm • link • report

Would two metro trains be able to fit side by side in a tunnel bored with this machine? Maybe WMATA can buy it after it is done here and start tunneling away on the new blue/loop line.

by NikolasM on Jun 10, 2015 2:39 pm • link • report

I'm confused by how this relates to the big "green infrastructure" announcement. Are there still 3 separate tunnels/tanks going into the Potomac , in addition to the green infrastructure?

by Jacques on Jun 10, 2015 2:41 pm • link • report

@JimT: I think it's reasonable to assume that, where practical, future sewage work will include separated systems. That's completely irrelevant to what DC water is doing with the Anacostia tunnel since they can't wait 100+ years to fix the overflow problem.

Note that "where practical" is actually a significant limitation. Combined systems were installed in the US up into the 1930s. Sewer mains are very infrequently replaced. (Not nearly on the order of 100 years--DC's centerpiece sewer at the old city canal hasn't changed significantly from the 1870s, and Boston is still using sewers installed in the 1700s.)

by Mike on Jun 10, 2015 2:58 pm • link • report

@Jacques: They are canceling one tunnel and making another tunnel smaller.

by Mike on Jun 10, 2015 3:02 pm • link • report

The "community concerns" seem a little odd.

The tunnel primarily exists to capture and collect runoff from neighborhoods north of the Anacostia River. Because the treatment plant is in Blue Plains, the tunnel *by necessity* needs to go through Anacostia.

Meanwhile, the Potomac outflows are (apparently?) a less serious/frequent event, and were able to be mitigated by a cheaper and low-tech means. Given that the project exists primarily to reduce sewer outflows, it seems likely that Anacostia's existing sewer infrastructure is sufficient to bring stormwater to Blue Plains without causing an outflow. As far as DC Water are concerned, there's no problem to fix in Anacostia.

There are great arguments to be made for building green infrastructure in Anacostia -- many of the features mentioned (bioswales, rain gardens) have been built as part of the Capitol Riverfront developments and 11th St Bridge Project, and should absolutely be replicated in Anacostia where possible. However, those probably don't impact the problem that the project is meant to solve.

by andrew on Jun 10, 2015 3:02 pm • link • report

@andrew

More specifically, there are hardly any CSOs draining the areas east of the Anacostia—so no need for green infrastructure to capture rainwater. There's one small basin around downtown Anacostia. Every other CSO in DC is west of the river.

by David R. on Jun 10, 2015 3:15 pm • link • report

You still benefit from green infrastructure east of the Anacostia because the runoff is polluted.

by JimT on Jun 10, 2015 3:37 pm • link • report

@ NikolasM -- Metro cars are 10' wide/11' or so tall, so two tracks would probably be too tight a squeeze to be workable. Without knowing contrary reasons though, it feels like you could make two separate tunnels with it (double the time, sure, though at 500' a week, even double the time for a 5.5-mile tunnel wouldn't be all that bad).

Anyone happen to know any more about why that is/isn't a feasible idea?

by SWesterner on Jun 10, 2015 3:42 pm • link • report

@JimT

Sure, we'd benefit from green infrastructure everywhere in the District, but we're talking about measures to mitigate CSOs and to comply with the consent decree.

by David R. on Jun 10, 2015 3:44 pm • link • report

Anyone happen to know any more about why that is/isn't a feasible idea?

Apparently the Green Line used a 19 foot tunnel boring machine in a similar manner, so that would seem pretty feasible to me. But the DC Water page about Lady Bird, one of the other boring machines DC Water is using (of the same size), describes the tunnels they're boring as "metro sized", so they very well may be large enough for the metro straight up.

by Zeus on Jun 10, 2015 6:15 pm • link • report

Umm, tunnel boring machines aren't a new thing. In fact, they have been used to build other parts of the existing metro system. All you need to do is come up with the billion+ dollars to use it to dig a tunnel and then fill it with all of the stuff needed for a metro line.

by Mike on Jun 10, 2015 6:22 pm • link • report

@ Mike --

Much as it might surprise, I am actually aware both that 1. TBMs have existed for some time, and 2. That at least some portions of the current system (namely, the Green Line tunnel between Navy Yard/Anacostia).

I was asking because I had been under the impression that most of the Metro construction had been cut-and-cover, and I suspected TBMs would allow for faster and less disruptive work. I was curious as to whether anyone on a transit-adjacent website might happen to know generally about how costs/timelines compare between the two methods, particularly in light of the fact that the city already owns a TBM (avoiding the need to purchase ~$100M in custom equipment).

As an aside: is there something about this question that just pisses people off? I asked about it a while back in another thread, and got similar condescension from someone then, too.

by SWesterner on Jun 10, 2015 6:54 pm • link • report

TBM is still tremendously more expensive than cut and cover. You're getting this reaction because your question is kinda like saying "hey, I've got this hammer, I should just build a house to take advantage of the hammer". The TBM is not the expensive part of the project; the engineering alone will cost more than the TBM. Stations are pretty expensive, also.

by Mike on Jun 10, 2015 7:44 pm • link • report

It's true that sections of NW East of the Park and Georgetown will get LID solutions to reduce runoff, but it seems like a red herring to present that as a social equity issue in this specific case. LID was proposed specifically to reduce heavy infrastructure for certain overflows into the Potomac and Rock Creek.

But, I think there's no doubt that East of the River deserves LID and bioretention. It should be the standard replacement as roads are reconstructed, in general.

Unfortunately, this infrastructure has to fit into already crowded streets, so if you're not losing sidewalk width, you might be removing parking spaces. Which makes a lot of people sad.

by Neil Flanagan on Jun 10, 2015 8:54 pm • link • report

@Mike: "TBM is still tremendously more expensive than cut and cover. You're getting this reaction because your question is kinda like saying "hey, I've got this hammer, I should just build a house to take advantage of the hammer".

Obviously TBM are cheaper than cut-and-cover in some situations, namely deep tunnels. It depends on the situation; obviously we would not have them if they were always more costly.

BTW, @SWesterner's notatation and criticism of the "reaction" is legitimate.

by tondo on Jun 10, 2015 9:09 pm • link • report

@tondo: Cut and cover isn't used for deep tunnels; if cut and cover is one of the options being considered, it isn't (or doesn't have to be) a deep tunnel. I took the question to be whether switching from a shallow cut and cover tunnel to a deep TBM tunnel could save money by going under existing infrastructure. The answer is no, it costs too much to build a deep tunnel. In some cases someone might be willing to do it to minimize disruption on the surface, but it won't be to save money. In practice I'd be much more likely to expect that some variant of the new austrian method would be used for a shallow tunnel if the goal is to avoid street disruptions, rather than a deep tunnel, and that might actually end up being cheaper. (Depends on the geology. I'm doubtful it would work in most of DC.) TBMs are evaluated as an economic

alternative to manual digging or blasting, not cut and cover.

by Mike on Jun 10, 2015 9:33 pm • link • report

@Mike: the reason why cut-and-cover is not used for deep tunnels is that other means are cheaper. Technically it is possible.

by tondo on Jun 10, 2015 10:47 pm • link • report

@tondo: sure, it's possible in the same way we [i]could[/i] get to england by building a really long causeway, but we don't because basically anything else is a better idea. I'm not even sure why you brought that up, since I didn't say it wasn't possible--I said that it wasn't done.

by Mike on Jun 10, 2015 10:57 pm • link • report

Green infrastructure, such as bio-Swales and green roofs, treat only the rain water runoff, and do nothing to treat the sanitary sewage (which is far worse of a problem). Sure, peak flows will be reduced, but only for the smaller storm events. Large storm events, which cause the combined sewer overflow, would be mostly unchanged from green infrastructure.

A large storage facility like this will have a much greater impact on water quality in this case. Green infrastructure will still probably be implemented overtime to cover the small rainstorms, so there is no loss.

by Chris Allen on Jun 11, 2015 7:04 am • link • report

@Mike: you could use cut-and-cover for deep tunnels the same way the great pyramid was built, channeling 50% of the economy to a single project. Point is, it has been done, and the technology to do it has been available since 2500 BCE. There is no technology to build a causeway over the ocean, as the depth will overcome any structure humans have built to this day.

The other point, of course, is that as a tunnel descends it will pass from cut-and-cover depth to TBM depth. The transition is where the two methods are of equal cost. So it is this depth where the best means of construction is not so clear.

by tondo on Jun 11, 2015 8:12 am • link • report

@tondo: "Point is, it has been done"

please name just one deep (>100ft) tunnel that's been built using cut and cover. Before tunnel boring machines (that is, for thousands of years), the way you'd do that would be to first dig a vertical shaft, then a horizontal shaft. all the TBM adds is a reduction in manual labor and a smoother wall. What you're suggesting would require a phenomenal amount of fill to be removed, and would never be attempted because it adds nothing but complexity over digging a shaft.

Although I guess that's one way to get enough fill for the transatlantic causeway.

by Mike on Jun 11, 2015 8:24 am • link • report

@Jim et al> DC Water has actually separated out selected sewersheds in upper 16th St/Alaska Ave, some along Rock Creek and a few on the Anacostia. Separating two small sewersheds in Georgetown is part of DC Water's new plan. But widespread separation is probably both financially and politically not feasible. We have a lot to learn about green infrastructure, but the huge volumes of pollution discharged to the Anacostia made that a priority for the tunnels. And as others have observed stormwater itself is not exactly benign. As it is, with large numbers of rate payers at or below the poverty line, DC Water is close to the limit of what the system can support.

by March Wentworth on Jun 11, 2015 9:16 am • link • report

How come Bloomingdale has not flooded in the last 3 years? Did DC Water fix the problem back in 2012? I know we have not had a derecho, or that level of rainfall like in 2012, but there has not been a drop of water on RI Ave and we have still had plenty of storms. They used to have to rescue stranded drivers with a boat.

by Joe on Jun 11, 2015 10:56 am • link • report

@Mike: the line you've drawn is foolish. The depth you selected is arbitrary, so why not pick something ridiculous, like 1000 ft? I guess that means you win the argument.

(And BTW, the cut-and-cover rescue pit for Bertha is 120 ft.)

by tondo on Jun 11, 2015 11:10 am • link • report

As an aside: is there something about this question that just pisses people off?

It's putting the cart way, way before the horse.

If there's an actual plan (environmental clearance, funding, design, etc) in place, then you can start digging. But there is no benefit to hanging on to a TBM just because it happens to dig tunnels, and Metro also runs in tunnels. You won't likely save anything in terms of cost.

It's not like Metro would be digging new tunnels tomorrow if they only had a TBM available to them.

by Alex B. on Jun 11, 2015 11:18 am • link • report

@tondo: maybe you're just confused about what cut and cover tunneling means? The rescue pit for Bertha is a shaft, not a tunnel. Yeah, picking 100 feet is arbitrary. It's also fairly common. You can propose some other depth, but I can assure you that you won't convince many people that something only 20 feet deep is a "deep tunnel". I'm not even really sure what you're arguing about at this point, other than just wanting to argue.

by Mike on Jun 11, 2015 11:19 am • link • report

Foam to soften rock? And where if "offsite" to dispose of this material? This is environmentally safe?

by Cheryl on Jun 11, 2015 12:08 pm • link • report

@Mike: "you're just confused about what cut and cover tunneling means"

Gosh, you must be right. What does it mean?

by tondo on Jun 11, 2015 7:41 pm • link • report

And there is no plan to ever separate the combined system, even when areas are redeveloped, aside from maybe a few spots so small that you did not bother mentioning it?

No. DC Water, DDOT and others have a lot of initiatives in place that are designed to spearate the stormwater runoff from the sewage, it just all occurs before water gets to the sewer. There are programs in place to increase green roofs, raingarderns, rain barrel use, bayscaping, bioswales, impermeable surface removal, the use of permeable surfaces. These are small projects, but part of a very large effort that should remove a separate a significant amount of rainwater. There's also a tax on permeable surfaces and credits for adding stormwater reduction tools.

by David C on Jun 17, 2015 10:50 am • link • report

Street drains eventually are rebuilt, though it may be on the order of once a century. That's when one can put in a dual pipe system.

Oh boy. I spent a year replacing the ground system for a satellite and it just about killed me. And there we were just replacing computers and software (while trying to keep the old system working). I had a still shot of Indiana Jones replacing the gold head with the bag of sand as analogy.

Trying to replace a combined sewage system with separated one would be hard. Doing it piecemeal and in a random order (think of the way the bike lane network has been phased in) over the course of a century....it makes me want to roll up in the fetal position under my desk.

by David C on Jun 17, 2015 10:57 am • link • report

David C is right. Combined sewers are about 9 ft down, but the larger ones -- some as large as 23 ft in diameter -- are even deeper. This would make the 1st Street Tunnel at McMillan a mere bagetelle.

by luckybiker on Jun 17, 2015 11:20 am • link • report